MADRAS:
PRINTED BY HIGGINBOTHAM & CO.,
$\frac{1}{164}$, $\frac{2}{164}$ & 165, MOUNT ROAD.

A MANUAL

OF

INDIAN CATTLE AND SHEEP,

THEIR BREEDS, MANAGEMENT AND DISEASES.

BY

JOHN SHORTT, M.D., V.S., F.L.S., F.Z.S., &C.,
RETIRED DEPUTY SURGEON-GENERAL, MADRAS MEDICAL DEPARTMENT,
Fellow of the University, Madras, &c., &c.
Corresponding Fellow of the Societie d'Anthropologie of Paris, and of Anthropologie, Ethnologie and Urgeschite of Berlin, &c., &c.

SECOND EDITION.

MADRAS:
HIGGINBOTHAM AND CO.
By Appointment in India to His Royal Highness the Prince of Wales, and Publishers to the Madras University.
1885.

PREFACE TO THE SECOND EDITION.

A SECOND edition of the Cattle Manual of India has been found necessary to follow the first edition which was published several years ago, and worked its way slowly but surely to public favour. Its success will I hope, with all its faults, be more universally and rapidly extended to the present volume. As space forbids an exhaustive treatment of the subjects brought to notice in the work, it has been my endeavour to be not only accurate and useful, but as brief as possible, and to make it a trustworthy companion on the subject of which it treats. The whole work has been carefully revised, with a few statements here and there struck out, and some forty pages of fresh matter have been added. I have stated nothing that my own personal experience has not verified during a long series of years of cattle-practice in India.

THE AUTHOR.

PREFACE.

A work on the diseases of Indian Cattle has long been wanted, and I have attempted to supply the want. My aim in the composition of the following pages has been to be as concise as possible in the every-day treatment of Cattle in this country.

I have confined myself to as few well-known drugs as possible, such as are cheap and easily obtained in most villages and bazaars, with the exception of a few medicines which also are cheap and easily procurable in the chief towns.

I have inserted nothing that my own experience in Cattle-practice has not confirmed during the last thirty years in many districts of India; in all of which I have seen, examined and frequently treated the different forms of Cattle-diseases.

To the Board of Revenue I have to tender my best thanks for their courteous permission to make use of an Essay on the "Indigenous Breeds of Cattle," for which a prize of one hundred rupees was awarded to me at the Agricultural Show of 1874 at Sydapetta; as also for copies of Messrs. Thacker and J. H. B. Hallen's Manuals and other papers on Cattle-diseases.

The several Plates contained in this Manual were specially prepared and have been taken chiefly from Photographs.

TABLE OF CONTENTS.

Introduction; The Circulation; Respiration and Utility of the Cow.. 1—5

CATTLE.

Indigenous Breeds, Mysore, Nellore, North Arcot, South Arcot, Tanjore, Trichinopoly, Salem, Coimbatore; Aden Cattle; Age; Neat Cattle; Names at different ages; Abortion or Miscarriage; Calving; Inversion of the Womb; After-birth or Placenta; Milk or Puerperal Fever; Red Water; Milking; Milk; The Composition of Milk; Butter-making; House-churning; Bottle-churning; Churns; Butter; Ghee; Garget; Sore Teats; Cow-pox; Calves; Navel Ill; Costiveness; Scouring or Diarrhœa; Food of Milch Cows...................... 7—62

CATTLE DISEASES.

Anthrax Fever; Apoplexy; Bronchitis; Catarrh; Calculi; Choking; Colic; Constipation; Cattle Poisoning; Diarrhœa; Dysentery; Dropsy; Distension of the Rumen; Fever; Fardel Bound; Epizootic Aphthæ or Foot and Mouth Disease; Hydrophobia; Hove, Tympanitis or Blown; Hamaturia or Bloody Urine; Hydatids; Inflammatory Fever; Inflammation of the Brain, Heart, Bowels, Liver, Lungs and Kidneys; Jaundice; Loss of Cud; Paralysis; Malignant Sore Throat; Rinder Pest; Rheumatism; Splenic Apoplexy; Tetanus or Lock-jaw; Ophthalmia; Diseases of the Feet; Sprains; Dislocation; Wounds and Bruises; Hernia; Mange; Leech in the Nose; Broken Horn; Infectious Diseases; Prophylactic Measures; Segregation.................................... 63—106

THE BUFFALO.

Varieties; Calves; Toda Buffalo......................... 107—112

SHEEP.

Indigenous Breeds, Nellore, Madras, Coimbatore, Mysore, &c.; Names at different ages.................................. 113—128

Diseases of Sheep.

Scab; Dysentery; Purging or Diarrhœa; The Fluke or Liver Leech; The Husk, Hoose or Thread-worm; The Rot; Catarrh or Cold; Bronchitis; Inflammation of the Lungs or Pneumonia; Tetanus; Rabies or Hydrophobia; The Gad Fly; Flies; Parturition .... 128—140

Goats.

Goats; Milch Goats, &c.. 141—147

APPENDIX.

Milk Experiments; Memo. of Cattle Food and Work, &c.; Value of Ground-nut Cake; Load for Carts; Speed of Loaded Carts; Indian Cross-breeds of Cattle; English Cattle; English and Vernacular names of Cattle-diseases; Memo. on Fodder Grasses; Index.. 148—171

ORDER OF PLATES.

Plate 1.—Mysore Bull and Cow—Amrit Mahál Breed ....to face p. 8
,, 2.—Mysore Trotting Bullocks—a pair of Gun-Carriage Bullocks—Hoonsoor Breed .... ,, 16
,, 3.—Nellore Bull—Government Farm, Sydapet.—Adanki Cattle Show—Prize Heifer .... ,, 17
,, 4.—Nellore Bull and Cow .... ,, 18
,, 5.—Poonganoor Cow—Prize—Nellore Cow and Calf ... ,, 20
,, 6.—Dr. Shortt's Bull—"Ruthnum"—Salem Breed—Captain Markham's Salem Cow .... ,, 21
,, 7.—Village Cow, Arcot—Village Plough Bullocks ...... ,, 20
,, 7A.—Guzerat Cow and Head of Guzerat Cow............ ,, 24
,, 8.—Teeth at Birth—Second Week—Third Week ...... ,, 33 & 34
,, 9.— ,, ,, Fourth Week—Eight Months—Eleven Months .... ,, 33 & 34
,, 10.— ,, ,, Fifteen Months—Eighteen Months—Two Years .... ,, 33 & 34
,, 11.— ,, ,, Third Year—Fourth Year—Fifth Year... ,, 33 & 34
,, 12.— ,, ,, Sixth Year—Tenth Year.—Age shown by Rings found on the Horn .... ,, 33 & 34
,, 12A.—Dr. Shortt's Nirmul Buffalo Cow "Ramee" ...... ,, 107
,, 13.—Bellary and Nellore Ram .... ,, 114
,, 14.—Mr. J. D. B. Gribble's Ram—Cross between Nellore and Mysore—Mr. J. J. Corbett's Hornless Ram, with Mane .... ,, 115
,, 15.—Coimbatore Ram—Dr. Shortt's Coimbatore Ewe, recently clipped .... ,, 116
,, 16.—Dumba, or Fat-tail Sheep—Mysore Ram .... ,, 117
,, 17.—Dr. Shortt's Mysore Ram and Ewe, recently clipped .... ,, 118
,, 18.—Colonel Macaulay's Four-horned Ram—One-horned Sheep .... ,, 120
,, 18A.—Milch Goat with a reserved Kid—An Afghan Billy Goat .... ,, 146
,, 19.—Mr. Samuel Arathoon's Bull—Mr. Alfred Arathoon's Cow—"Beauty" .... ,, 156
,, 20.—Devon Prize Cow "Dairymaid"—Devon Prize Bull "Britton"—imported by W. H. Oakes of Madras.. ,, 157

INTRODUCTION.

To be successful in the treatment of disease in cattle, it is necessary to thoroughly understand and accurately interpret the various signs that indicate its presence, displayed in many instances by the attitude of the animal; and to form a correct diagnosis, three points should be remembered,—

1. The indication of various ailments that animals exhibit, characteristic of disease;

2. A practical knowledge of the habits and disposition of cattle; and

3. The power of discriminating a healthy from an infected animal.

The first impression a patient makes on the practitioner should not be lost sight of, as it may at once enable him, by the appearance and attitude of the animal to determine whether a slight or severe attack is impending, as also its nature and cause; but in many instances he may be puzzled to know what the ailment is, as it has to be inferred simply from any symptoms of suffering which the patient may exhibit.

Experience will often assist the practitioner in prognosticating the progress and termination of disease.

As "Neat Cattle" form the subject of this treatise, it will be necessary to glance at their habits, &c. They belong to the class "Mammalia," and the order "Ruminantia," from ruminating or chewing their food a second time; and owing to this fact, ruminants differ from most other animals in the conformation of their digestive organs, which, being complex, require to be understood to be successfully treated.

The Ox has 4 stomachs, termed,—1, the Ingluvies, Paunch or Rumen; 2, the Reticulum or honey-combed stomach; 3, the Manyplies, from its plicated structure; and 4, the Reed or Abomason. The food gathered and cropped by the lips, tongue and teeth, is sent down the gullet to the first stomach or "Paunch," where it undergoes maceration, being moistened with fluid secreted by the walls of the bag; and is then carried on to the second stomach or Reticulum, from whence it is returned to the mouth in instalments to undergo mastication, termed Rumination, or in popular parlance, "chewing the cud." When this process is completed, the food is sent down to the third stomach or Manyplies, where it undergoes further commutation, and being fitted for digestion, finds its way to the fourth stomach, the "Abomason," where true digestion takes place, and the softened food is converted into "Chyme" for the nourishment of the animal,—whilst the effete portion passes through the intestines and is eventually discharged as dung.

It is well to remember that, owing to the complex nature of the digestive canal, the treatment of cattle is sometimes unsuccessful, as the medicines administered, instead of finding their way to the true or fourth stomach, the "Abomason," may, at the will of the animal, enter the Paunch or first stomach, and remain there without producing any effect, and even accumulate, dose after dose, till they eventually reach the true stomach, probably 2 or 3 days after, producing violent effects by overpurgation, &c.

"The peculiarities of the action of medicines in cattle are chiefly referable to the construction of their alimentary canal, and to their phlegmatic temperaments. In these ruminants, the stomach is quadrisected, is much less vascular than in most other animals, is chiefly covered with cuticular mucous membrane, and (as regards its three first divisions) is almost mechanical in its action. The first and third

compartments of the stomach always contain food, often in large quantity. These facts explain why cattle require such large doses of all medicines, why irritant and corrosive poisons can be given them with impunity, even in very large doses, and why purgatives, unless in large doses and in solution, are so tardy and uncertain in their effects. Their kidneys and skin are somewhat less easily acted on than the corresponding organs in the horse; and their dull and phlegmatic disposition resists the action both of stimulants and tonics. Sheep closely resemble cattle in the way in which they are affected by most medicines."—*Veterinary Medicines, their action and uses, by* FINLAY DUN, V. S., 1854.

THE CIRCULATION.

The heart in animals is not only the centre but the chief and prime source of circulation, the vessels concerned in the distribution of blood being the arteries, veins and capillaries. The arteries take "arterial" or "bright blood" from the heart, and the veins bring back "venous" or "black blood" to the heart. The capillaries are the fine hair-like vessels that are intermediate between the arteries and veins. They distribute arterial, and bring back venous blood from different parts of the system to the centre of circulation, the heart.

The pulse is caused by the expansion and contraction of the heart and arteries in propelling blood into the system. This action is constant and unremitting. By feeling any one of the more exposed arteries of an animal, we are able to count the number, and ascertain the force, quickness and regularity of the circulation, which constitutes what is called the "pulse." Thus, for instance, in man the pulse is felt at the wrist, in the horse at the lower jaw, but in the ox the temporal artery is generally recommended, and as it may be difficult at times to find it there, recourse is often

had to the heart itself. By placing the hand on the left side of the chest, a little within and behind the elbow, the beats of this organ can be readily felt and counted, and the state of the circulation ascertained. The manner of the flow, or the quantity that is propelled at each pulsation cannot be so well ascertained as when an artery is compressed against a bone,—nevertheless a clue as to the state of the circulation is gained, and the indications thus given are of much practical value in the treatment of disease. The action of the heart in the ox when in a state of health averages about forty beats per minute.

RESPIRATION

Consists in the act of inhaling and exhaling air through the lungs. Oxygen gains access by this means into the lungs, and is distributed over the small air-cells of that viscus, where it enters into combination with the blood, rendering it of a light arterial or scarlet color, and passes with it to every part of the body: in the capillaries, it combines with the carbon and hydrogen of the effete tissues, forming water and carbonic acid. The blood now rendered black and venous, is returned to the lungs, where it gives out its carbonic acid and receives a fresh supply of oxygen. On respiration the health and vigour of animals depend, and therefore, all animals require not only fresh air, but sufficient breathing space when housed.

UTILITY.

There is scarcely a part of the cow that is not turned to account. When alive, she enriches her proprietor with a calf every year or eighteen months, and supplies him with milk, subsequently converted into curds, ghee, &c., while her urine and dung enrich his fields as manure. Notwithstanding the superstitious veneration in which the cow is held by Hindus generally, and its flesh being considered sacred, the milk forms a most valuable and rich nutriment, and is freely partaken by all castes.

When slaughtered, the flesh supplies beef to the greater portion of the world; the skin furnishes leather, and the uses to which leather is put are manifold; the hair is valuable in various manufactures; the horns are wrought into boxes, combs, knife-handles, and drinking vessels; the bones furnish a fair substitute for ivory; glue is made from the cartilage, gristle and refuse of the hide; the sinews are used by saddlers and others instead of thread; the feet yield a valuable oil termed neat-oil from "Neat," the generic name of these animals, which oil is of great utility in preparing and softening leather; and the fat is converted into candles; so that no part of the animal is rejected.

The Indigenous Breeds of Cattle in the Madras Presidency.

THE cattle of India form one of the Bovinæ, genus Bovidæ, order Ruminantia. The genus Bovidæ is divisible into three groups: 1, Bisontine or Bison; 2, Taurine or Ox group; and 3, Bubaline or Buffalo. Of these three groups, the Taurine, comprising the ox or bull, is the most important to man as, during life, it contributes most materially to his wants, and when dead, every part of every individual in it may be converted to his use. The Indian ox is termed scientifically *Bos Indicus* or Indian *Zebu*, popularly the Brahmin bull, and comprises several varieties, all of which are remarkable for having long pendulous ears and a fatty elevated hump on their withers, and are generally held sacred by the Hindus, who consider it a sin to kill them, and pollution to partake of their flesh. The bull is worshipped under the name of *Nundee*, having formed the vehicle of their deity *Siva* during his peregrinations; but, while a Hindu will in consequence starve to death alongside of a fat bull or cow rather than consume its flesh, he will yet partake freely of the milk of the latter. Cattle in India comprise, in most districts, the wealth of the agriculturist or ryot, and perform most of his agricultural operations either with the plough or in carts, or as beasts of burden to convey produce from one district to another. They furnish him also with animal food in the shape of milk and ghee, and the hide is made into leather-thongs and water-buckets. The Indian ox is still met with wild in some parts of Southern India. The late Dr. Jerdon, in his work on the "Mammals of India," mentions his having shot one near Nellore in this Presidency, in 1843: in 1848, I myself saw a fine cow that

was shot by Lieutenant Lord David Kennedy of the 1st Light Cavalry, within 30 miles of Arcot, the flesh of which was rich and of excellent flavor.

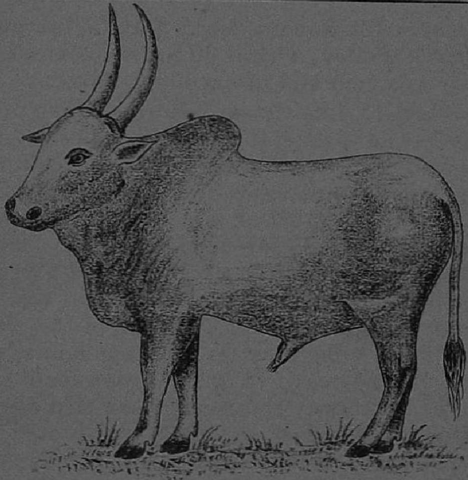
Indian cattle, like those of Europe, vary in most districts either as to size, form and symmetry, or as to the growth and length of their horns, according to the varying local peculiarities of climate, soil and fodder, natural or artificial, all of which tend to influence the form, size and character of the animal. The native, who lives on a meal of rice and perhaps a few herbs to season the same with, expects that his cattle will, in like manner, pick up what they can in the way of pasture about the village or its adjacent lands, so that he never troubles himself to grow green food or prepare dry fodder for them; the same plant that supplies him with grain, feeds his cattle also with its straw. In most towns and villages cattle are driven out at all seasons to graze abroad, but they more frequently lick the dust only, and return home with their stomachs as empty as when they started, to receive perhaps a few handfuls of straw or rubbish, just sufficient to sustain life.

Perhaps it will be better however for me first to describe the different breeds of cattle to be met with in India, and point out the distinguishing features of each, and the circumstances to which it is best suited, with the use to which it can be turned; and then to review the whole subject with suggestions as to improvement for practical application.

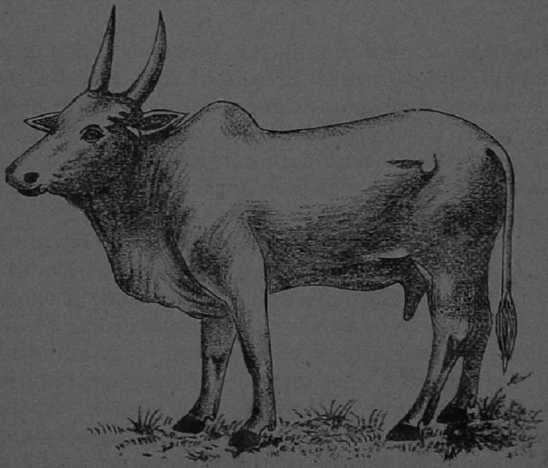
Mysore.—The cattle of this district are justly celebrated as draught cattle and for their spirit and powers of endurance: they are active and quick in their paces, somewhat restive, and fiery in disposition. The height of the Mysore bullock varies from 12 to 15 hands, with a good compact carcase; the horns are straight and long, extending from 2 to 3 feet in length, tapering and sharp-pointed, inclining upwards, slightly convex on the outer and concave in the inner side, and approach-

To face page 8.

PLATE I.



MYSORE BULL—AMRUT MAHAL BREED.



MYSORE COW.

G. Packtensky, Lithog.

For Higginbotham & Co., Madras.

ing each other at the tip. Countenance, sprightly; eyes, large, black, prominent, expressive and full of fire; face, long and moderately narrow; muzzle, eye and hoof, black. Head, erect and well carried on a moderately-sized and well-formed neck which rises over the withers into a well-shaped and fair-sized hump, giving grace and beauty to the animal. Back, straight; tail, flat and well set; a fair width and depth of chest; carcase, well rounded and shaped with a small dewlap. The legs are clean, straight, well-apart and standing out, forming a good base for the support of the body. Skin, moderately fine and covered with short soft hair. The prevailing color is of varying shades of grey from dark to a very light grey or white. It is generally a high-spirited animal, and requires kind and conciliating treatment to break in; the nose-string is invariably used not only in bulls and bullocks, but with cows also.

The cows milk fairly, yielding from 1 to 2 measures in the 24 hours. The value of a good cow ranges from 35 to 70 rupees, while that of a first-class pair of bullocks varies from 200 to 250 and even 300 rupees. Ordinary working bullocks fetch from 70 to 150 rupees the pair.

The following interesting account of Mysore cattle, and their different breeds is taken from Rice's Manual of Mysore :—

"The principal breeds of horned cattle in Mysore are the Amrit Mahál, Madesvaran Betta, the Kankanhalli, and the village cattle. Almost all other cattle seen in the country are importations or crosses between the above-mentioned breeds.

The Amrit Mahál,[1] literally Milk Department, is an establishment for the breeding of a race of cattle pecu-

[1] The particulars are taken from a pamphlet containing the History of the Amrit Mahál, compiled from the Records of the Department by Captain M. A. Rowlandson, and one on Hunsur by Dr. Gilchrist with corrections by Major McInroy, the officer now in charge, to whom I am indebted for them.

liar to the country of Mysore, and famous for its utility for military purposes. The establishment was founded at some time during the Hindu Government with special privileges as regards grazing, but its maintenance for the special purpose of supplying draught cattle for Artillery is due to Haidar Ali. He is reported to have introduced a breed of cattle from the Trichinopoly country, by a cross between which and the indigenous breed of Mysore was produced the Hallikar breed, which is considered the best in the whole establishment. Great doubt exists as to what the breed imported was, but general tradition points to the small Brahmin bulls, which to this day are noted for their endurance and fast trotting powers. 'It was this establishment,' wrote Sir Mark Cubbon, 'which enabled Haidar Ali to march 100 miles in two days and a half to the relief of Chilambrum, and after every defeat to draw off his guns in the face of his enemies; which enabled Tippoo Sultan to cross the peninsula in one month for the recovery of Bednur, and to march 63 miles in two days before General Medows; which in later times enabled General Pritzler to march 346 miles in 25 days in pursuit of the Peshwa; and which enabled General Campbell, after the failure of his Bengal equipments, to advance upon Ava, and bring the war to a favorable termination.' It was also this establishment which enabled the Duke of Wellington to execute those movements of unexampled rapidity which are the admiration of every military man, and in consideration of whose services he recommended it to protection in a letter addressed at the close of the war to the Commander-in-chief. Allusions in the Wellington Despatches shew that the Great Duke often during the Peninsular War in Spain regretted that he had not the assistance of the Amrit Mahál cattle.

After the capture of Seringapatam the Breeding Establishment was intrusted to the native Government,

and the Public Cattle Department to an agent; but the inducements which had led Haidar and Tippoo to keep up its efficiency were wanting, and by the end of 1813 the cattle had degenerated to such a degree that the management was taken over by the British, and 10,914 head of breeding cattle, the exact number made over to the Rajah's Government in 1800, received back. A Commissariat officer (Captain Harvey) was placed in charge with a suitable establishment, and up to the 31st July 1816, the number of cattle had increased to 14,399, exclusive of 900 calves transferred as fit for service. By 1823 the original number had nearly doubled itself, besides supplying for the public service, young bullocks equal to one-fourth part of the increased establishment. In 1860, from motives of economy, Sir Charles Trevelyan ordered the establishment to be broken up, and the herds to be sold; but the results were to the detriment of the public service. The Amrit Mahál was therefore, with the cordial approval and assistance of the late Maharaja, re-established in December 1867 with 5,935 head of cattle. In 1871 there were 9,800 head of all sizes, exclusive of 1,000 young male cattle in the Training Depôt. It has been arranged that a certain number of bulls shall be handed over to the Mysore Government annually, which are stationed at various points in the country for the purpose of improving the breed of cattle used by the ryots.

The cattle are divided into 30 herds containing from 200 to 700 head of cattle each; for the grazing of which 208 kavals or pasture grounds have been allotted in various parts of the country.[1] They are divided into hot weather, wet weather, and cold weather

---

[1] Though a herd consists of both males and females of various ages, they are not allowed to graze in immediate company, each being divided into seven lots, called páls, to prevent their injuring one another. The average number of attendants or graziers is one to every fifty head of cattle.

kavals, according to the seasons of the year during which they are of most use. The hot weather kavals are generally the beds of tanks in which grass springs up during the hot months, and near which there are trees for the purpose of affording shade to the cattle during the heat of the day. These are very valuable kavals, and are reserved as far as possible for the sole use of the Government cattle. The cold and wet weather kavals are those which during those seasons have plenty of grass and water, but which during the hot weather dry up, and are of little use to the department. In both the latter descriptions of kavals the ryots' cattle are permitted to graze certain fixed portions, and after the Government cattle have left for their annual visit to the jungles, the Shervegars are permitted to sell some part of the grazing, and from the funds thus obtained the Kavalgars or guards are paid, and other expenses met. This privilege ceases at the end of July each year.

The Amrit Mahál cattle comprise three varieties, called the Hallikar,[1] Hagalvadi and Chitaldroog, from the districts which originally produced them, and may be readily distinguished from every other breed in India, by the peculiar shape and beauty of their heads, and the symmetry of their form. They seldom attain an extraordinary height, but in proportion to their size are remarkably deep and wide in the chest,

---

[1] An absurd legend is current among the herdsmen of the department regarding the origin of the Hallikar. They state that Haidar Ali, after one of his trips to the south, brought back to the Mysore country a number of cows of the small Brahmin caste. These cows were turned loose into a kaval (in the Tumkur District) in which there were great numbers of antelope, and a cross between the big black bucks and the small Brahmin cows gave the present Hallikar breed. In support of the story they point to the small spot below the eye common to antelope and to Hallikar cattle.

long and broad in the back, round in the barrel, well ribbed up and strong in the shoulder and limb.[1] They are active, fiery, and walk faster than troops; in a word they seem to constitute a distinct species, and possess the same superiority over other bullocks in every valuable quality that thoroughbreds do over other horses. The cows of this breed are white, but the males have generally an admixture of blue over the fore and hind quarters. There is a fourth variety of colored cattle, which are considered inferior to the white in energy and perseverance, though they rather surpass them in size. As the former breed is the most perfect that is known, it would only tend to its detriment to cross it with any other, and the bulls are accordingly bred in the best herds, and individuals selected from the best specimens distributed to improve breeds in the other herds.

A cow of this breed is supposed to give about one pucka seer of milk a day, and the calf could not be deprived of any part of it without being materially injured in its growth. The calves remain with their mothers during the day, but are separated from them at night, and are kept in a fold under charge of the herdsmen until they are three months old, when they begin to graze and get strength. In the cold season, when the herbage is abundant, they are generally weaned at the age of five months; but such as are brought forth later in the year cannot be separated from their mothers till after the hot weather.

After separation care is taken to conduct them to the richest pastures in the neighbourhood, and they are never supplied with any other food.

---

1 The general characters of a good bullock are a round barrel, stout strong legs and broad forehead. The average height is 48 inches, and 50 inches was about the highest standard, has very much increased since the re-establishment of the Department, 1867. Some of the bullocks now run up to 53½ inches. Of course weight is also a material consideration, the average is about 12 maunds or 43 stone, but no means have been adopted to determine this exactly.

Heifers begin to breed between three and a half to four years old, and bring forth six or seven times. Twenty cows are allowed to one bull. The bulls begin to propagate at five years of age, and retain their vigour till ten, when they are discarded from the herd. The average annual amount of births is 50 per cent. on the number of cows, and the proportion of males and females is nearly equal. The whole of the cattle, bulls, cows and calves, subsist entirely on what the pastures afford, and on the stalks of the castor, kulti and other nourishing plants which are left on the ground for their use after harvest in the months of January, February and March. This brings them into excellent condition at the most favorable season for the cows taking the bull. In the dry weather, when a want of forage and water prevails in the open country, the herds are conducted to the south-western jungles, where the natural moisture of the soil, the early showers, and the shelter afforded by the trees are favorable to vegetation. They arrive there in May, and return to their pastures in September, when the grass is in great abundance all over Mysore. The calves are castrated in November, the cold weather being found peculiarly favorable to the success of the operation, and invariably between the age of five and twelve months, as their growth is supposed to be promoted by early castration; and it is attended with this important advantage, that it prevents the cows being impregnated by inferior bulls, and consequently prevents the breed from degenerating. They are separated from the herds after four years of age, and transferred to the Public Cattle Department when turned of five, perfectly trained and fit for work. They arrive at their full strength at seven, and are past their vigour at twelve; they work till fourteen or fifteen, after which they decline rapidly, and generally die at eighteen years of age. The cattle of these herds are kept in their wild state without shelter of any descrip-

tion; they are very fiery, and cannot be approached by strangers without the protection of the herdsmen. It requires several months to break them in, and the employment is extremely difficult and dangerous.

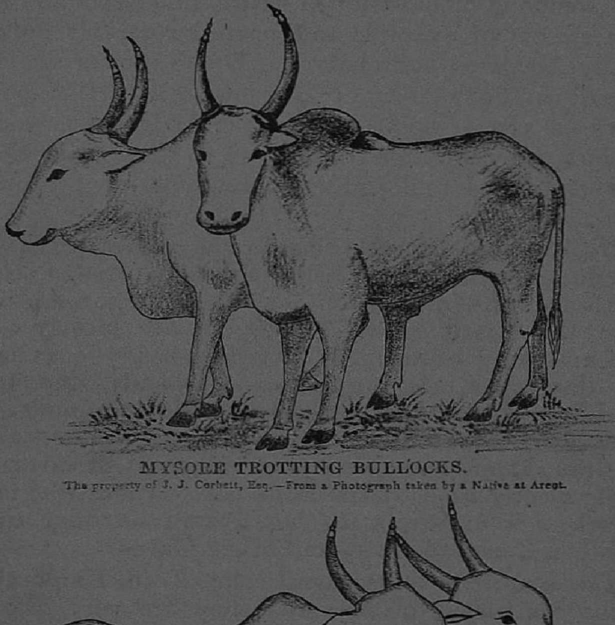
At the age of three years the catching of bullocks takes place, previous to which they are nearly as wild as the inhabitants of the jungle. The bullocks are first driven into a large oval enclosure, which they are made to enter with much difficulty. This communicates with a square yard surrounding an inner enclosure about 20 feet square, which is surrounded with a strong fence made of wooden posts placed close together and about 12 feet high. When they are collected in this, the opening is closed. The trainers then ascend on the top of the fence and throw a noose round each of the bullock's horns. This done, the end of the rope is passed between posts near the ground, and the animal is drawn close up and secured by people on the outside. The passage is then opened and old-trained bullocks admitted. One of the latter is bound by the neck to one of the wild animals, which being done, the rope is loosened, when he immediately endeavours to escape. His trained comrade however, to whom he is coupled, restrains him, though but partially; accordingly the two leave the enclosure at tolerable speed. The rope by which the untrained bullock was originally noosed, is allowed to remain attached to his horns, and when they approach one of the strong posts placed in the immediate vicinity of the enclosure, the rope is quickly turned round it, by which the animals are again brought up. The untrained bullock is then well secured by the neck with as little latitude of motion as possible. There he is kept alone for about two days, until he becomes considerably tamed and worn out with unceasing efforts to escape. The next operation consists in attaching to the animals a couple of blocks of wood, so heavy as to be moved with some difficulty, and giving him as much liberty as this admits of, he is then admitted to

the company of old-trained cattle, and from the two-fold effects of example and partial restraint he gradually becomes submissive. The bullocks are now grazed in the vicinity of Hunsur for a further period of three years, being tied up regularly each evening in lines, they are then transferred to the Public Cattle Department to undergo final breaking for the public service.

Madesvaran Betta.—This breed comes from the jungles and hills near Biligirirangan Betta on the south-eastern frontier of Mysore. They are larger than the Amrit Mahál cattle, but are loosely made and not well ribbed up. They have heavy loose hanging dew caps, sloping broad foreheads, and large muzzles. They are very heavy slow animals, but crossed with a Hallikar bull they form excellent cattle for draught and ploughing. Of this cross-breed are the cattle mostly used by the large cart-owners who carry on trade from towns in the Mysore territory to the Western Coast, Bellary, and other places.

Kankanhalli.—This breed comes from Kankanhalli in the south-east of Mysore; they are very like the Madesvaran Betta breed, but are generally smaller than the Amrit Mahál breed. They have thick horns, broad sloping foreheads and white very thick skins. In all other respects the remarks regarding the Madesvaran Betta breed are applicable to the Kankanhalli. The village cattle vary very much in size, color and characteristics; in some parts very fair cattle may be seen, but, as a general rule, the village cattle are a stunted inferior race. The cows generally give from half to one seer of milk per diem, though occasionally some may be met with, which gives 3 seers, but it will generally be found that these have been fed on nourishing food; such as oil cake, cotton seed, and such like. The bullocks are small, but for their size do a surprising amount of work."

PLATE 2.



MYSORE TROTTING BULLOCKS.

The property of J. J. Corbett, Esq.—From a Photograph taken by a Native at Arcot.

A PAIR OF GUN-CARRIAGE BULLOCKS—HOONSOOR BREED.

From a Photograph taken at the School of Arts, Madras.

G. Packzensky, Lithog.

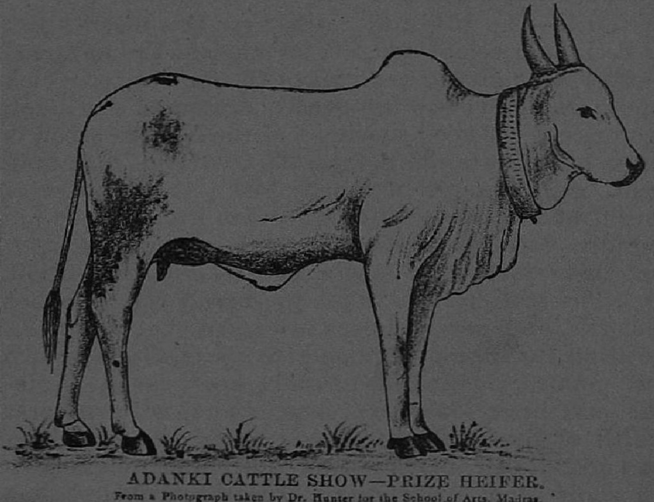
For Higginbotham & Co., Madras.

To face page 17.

PLATE 3.

NELLORE BULL—GOVERNMENT FARM, SYDAPET.

Drawn by T. G. Kelley, Esq.



ADANKI CATTLE SHOW—PRIZE HEIFER.

From a Photograph taken by Dr. Hunter for the School of Arts, Madras.

G. Packzensky, Lithog. For Higginbotham & Co., Madras.

AMRIT MAHÁL CATTLE.

("*Madras Mail*," *27th January* 1880.)

"At a time when the question of a supply of transport animals in Afghanistan is being anxiously discussed, it is worth while calling attention to the following extract from Captain Davidson's report on the Amrit Mahál cattle attached to the Bombay column of the English Army in Afghanistan forty years ago:—'No draught cattle in either army were so efficient as the 230 Mysore bullocks which accompanied the Bombay troops to Afghanistan. It was entirely from this very superior description of cattle that no part of the Bombay Park was required to be abandoned when the troops were returning to India over the almost impracticable roads through the Tobab mountains. These cattle were frequently upwards of sixteen hours in yoke. The draught bullocks with the Bengal Army were the property of Government, but were not, in my opinion, as fine animals as the Mysore bullocks.'"

Nellore.—The breed of cattle from this district has also been long celebrated, not so much as draught cattle as for the milking qualities of the female, for which purpose Nellore cows are greatly esteemed and fetch large prices. A good specimen of the Nellore breed is a huge animal standing from 15 to over 17 hands in height, with a noble but heavy look; their powers of draught and spirit of endurance are great; they are generally docile and slow in their movements, and, from their form and horns, are readily recognized. The horns are short and stumpy, barely 3 to 6 inches in length, and never, unless in exceptional instances, exceeding 12 inches,—inclined outwards, tapering to a blunt point. Countenance, dull; eyes, large, prominent and heavy-looking; face, short with greater breadth of forehead and muzzle; large lop ears; eye, hoof and tail-tuft, black; head, erect and well carried on a short stout neck rising over the withers into a huge hump which frequently inclines to one side;

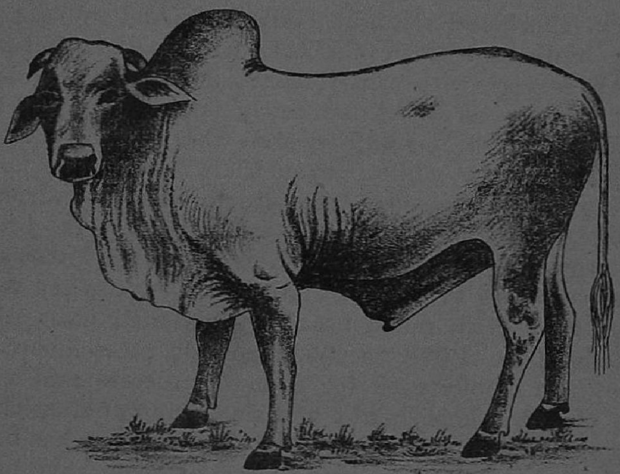
back, short and straight; tail, high and well-set; a fair depth and width of chest; carcase, compact and solid-looking, with a large heavy dewlap; legs, clean but massive, straight and fairly apart to support the carcase. Skin, fine and covered with soft short hair; prevailing color, white. From their docility, the nose-string is seldom used. They are noble and handsome-looking animals, but there is a tendency in the breed to grow tall and leggy with a spare light carcase. Their powers of draught are great, and when well-bred they draw much heavier loads than most other breeds, from 1,500 to 2,000 pounds on a fair road. They are chiefly used for draught in carts and with the plough, their height and size being against their use as pack bullocks generally. The cows, as has been said, are excellent milkers; some of them have been known to yield 18 quarts of good rich milk in the 24 hours (a quart being equivalent to 24 ounces), and they rear a calf at the same time.

The price of a first-class cow is about 200 rupees, as much as even 300 rupees have been paid for a prize cow; that of a pair of bullocks, 150 to 350 rupees; the ordinary bullocks fetch from 100 to 150 rupees the pair. Bulls have been imported into other districts at 300 and 350 rupees each.

The influence of this breed extends north as far as the Kistna District. In Vizagapatam, Godavery, Ganjam, and Orissa, a very inferior breed of cattle exists. They are small, under 12 hands in height, with small short horns never exceeding 6 to 12 inches in length, but possess a fair, long and compact carcase. They are used to draw the plough and cart though their chief value is as pack animals, their small size and sturdy forms being well adapted to the hilly districts with which those parts abound. About the Kemedy hills in Ganjam there is a more diminutive breed with

To face page 18.

PLATE 4.



NELLORE BULL.

From a Photograph taken by Orr and Barton, Bangalore.

NELLORE COW.

The property of J. J. Corbett, Esq., Arcot – Photographed by a Native

G. Packzensky, Lithog.

For Higginbotham & Co., Madras.

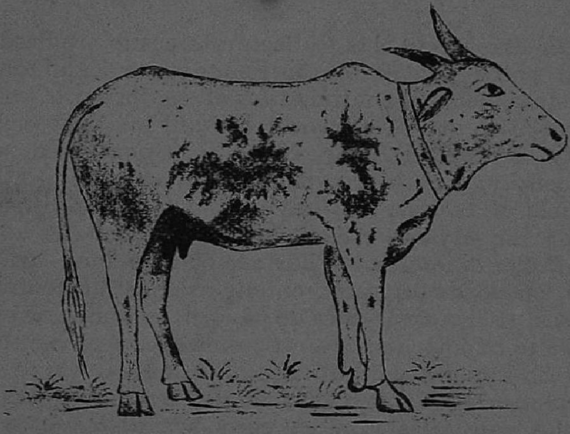
short and frequently crumpled horns. There is not much to be said in their favor except that the cows milk fairly. About the Godavery District I have seen some handsome and well-formed cows, which though small and not above 12 hands in height, yet to judge from their make, their erect carriage, fine small head, large outstanding udder and prominent well-developed teats, must have been good milkers. The best milkers are said to yield from 4 to 6 quarts in the 24 hours. The price ranges from 25 to 35 rupees for a cow; a pair of working bullocks, either for pack or plough, fetches from 40 to 60 rupees. The ordinary load of a pack bullock in these parts is 160lbs. From Godavery to Ganjam the prevailing color is a light chestnut shading off into a deep brown or red; and in Orissa it is white. The average price of cows in these parts, Vizagapatam and Ganjam, ranges from 10 to 35 rupees, and of a pair of working bullocks from 25 to 40 rupees.

Cuddapah and Bellary import their cattle chiefly from Nellore: these animals, from their size and powers of endurance are well adapted to draw the cart or plough through the soft black-cotton soil of these districts. The trotting bullocks, used to draw carriages, generally come from Mysore, and fetch from 150 to 200 rupees the pair, while the working bullocks, which come from Nellore, fetch from 80 to 240 rupees the pair. The prices of cows average from 35 to 70 rupees according to their milking powers, and they are principally small animals bred in the district. The bullocks reared in the district are a small hardy breed, chiefly used to draw the plough or carry packs. The best cattle of the kind come from the Pennakonda Taluq of the Bellary District, more especially from Pamdurti and the surrounding villages where the country is hilly and cattle are bred to some extent. A good pair of working bullocks sells for from 40 to 70 rupees.

North Arcot.—In this Collectorate cattle are bred in several parts, chiefly in the Poonganoor Zemindary, this estate being a continuation of the Mysore table-land. Cattle are also bred in the hill villages in the vicinity of Vellore, Kunneambaddy, Gooriattum, and Kungoonthy. They are small, rarely exceeding 12 to 14 hands in height, and having much of the appearance of the Mysore breed, with long straight horns about 2 feet in length. They are of all colors—white, brown, black, &c., and are chiefly used for agricultural purposes, to draw the cart or plough, or to act as pack animals to export and import produce. Among them are to be found some bullocks of fair size, which are good trotters. Their value ranges from 35 to 70 rupees the pair. Fair milch cows are also met with, whose value is dependent on their milking qualities, and ranges from 20 to 40 rupees.

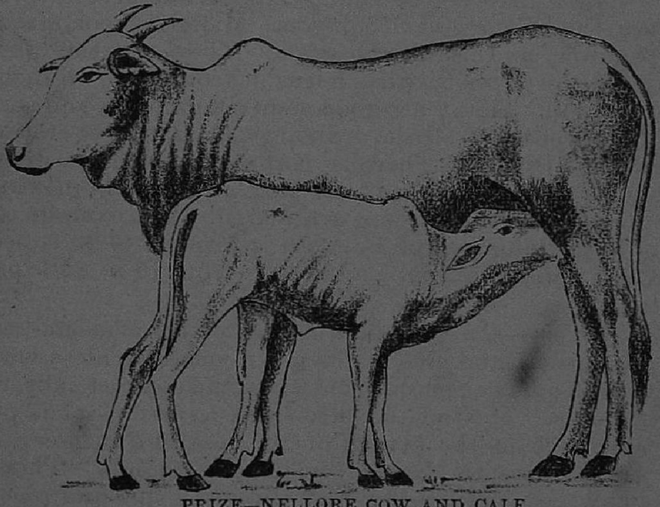
South Arcot.—The chief cattle-breeding places here are the villages of Kookiyoor, Maumanthoor, Seroopaukum, and Sunkerapooram. They are the usual small description, with horns of from 10 to 18 inches in length. Many are good compact animals, and serve the purposes of all the ordinary agricultural operations of the district. There is nothing peculiar to distinguish them from the cattle of other districts in which animals of a similar size are reared. The average cost of a working pair of bullocks is from 20 to 35 rupees. Cows milk scantily, and realize from 15 to 35 rupees each.

Tanjore.—In this district the cattle are small and diminutive, and among them is a small hornless variety which has a peculiar look from the complete absence of horns. Most of the latter have a small osseous protuberance in the centre of the forehead between the parts where the horns are usually found. Though small they are sturdy and draw the cart and plough very fairly, for which purposes they are used. A pair will realize from 35 to 50 rupees.



POONGANOOR COW.

The property of J. D. B. Gribble, Esq.—From a Photograph by a Native.

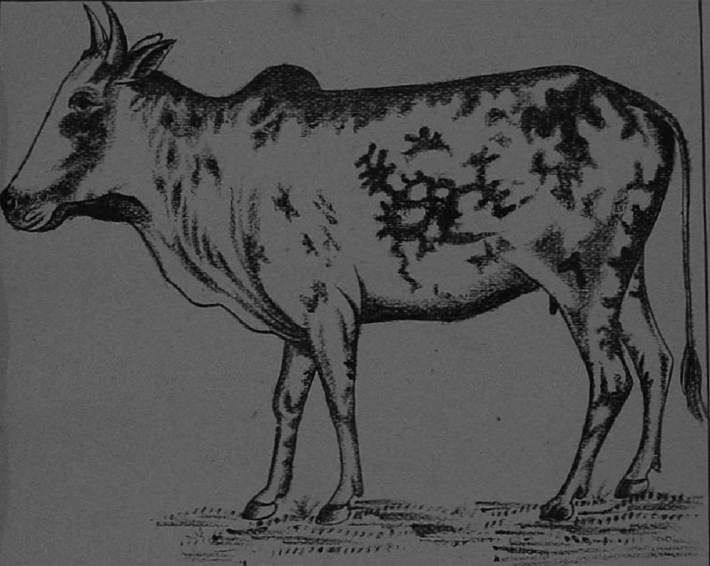


PRIZE—NELLORE COW AND CALF.

From a Photograph taken by Dr. Hunter for the School of Arts, Madras.

G. Packzensky, Lithog. For Higginbotham & Co., Madras.

To face page 20. PLATE 7.

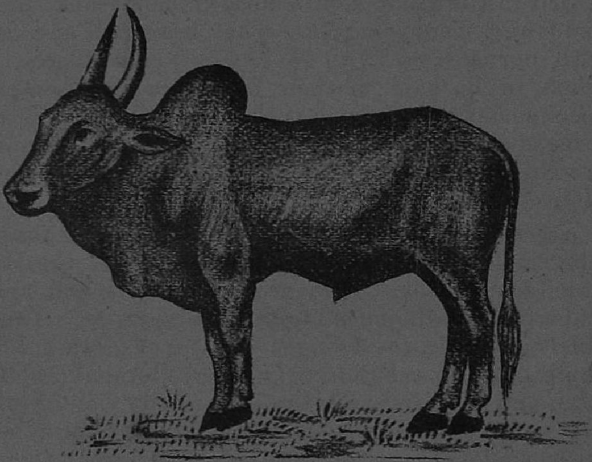


VILLAGE COW, ARCOT.

VILLAGE PLOUGH BULLOCKS.

G. Packzensky, Lithog.

For Higginbotham & Co., Madras.



DR. SHORTT'S BULL—"RUTHNUM"—SALEM BREED.

Bred on the Shervaroy Hills

CAPTAIN MARKHAM'S SALEM COW.

G. Packzensky, Lithog. For Higginbotham & Co., Madras.

Trichinopoly.—The cattle in these parts are chiefly reared in the villages of Valeecoondapooram, Rungenkedy and Thouyoor, &c. They are small and useful, with horns from 10 to 15 inches long. There is not much to be said in their favor, although some good specimens are to be met with among them. The usual price is from 35 to 50 rupees the pair, and the animals are chiefly used for agricultural operations within the district.

Salem.—This is a good cattle-breeding country. The cattle are of small size and resemble the Mysore breed somewhat. They are very active and spirited and trot well when used to draw a carriage. They are chiefly bred in the villages of Ahtoor, Namkul, Dharumpooree, Kistnagherry, Oossoor, Oothenkara, Tripatore, and Vaniembady, the hills in the vicinity affording good pasturage. The prevailing color is white, with moderately-sized horns from 15 to 18 inches in length. The face short, eyes expressive and prominent, of rather spare make of carcase, quick and active in their movements. They are much appreciated for their spirit and activity, and make good trotting bullocks for light carriages. Some are sturdy, and do well all the agricultural work required of them in the district. A pair of working bullocks costs from 35 to 70 rupees. Trotting bullocks fetch 120 rupees. The cows are considered fair milkers, and yield from 3 to 4 quarts in the 24 hours, their value ranging from 20 to 35 rupees when in full milk. Bullocks of this breed are exported from Salem and Palghaut to Madura and Tinnevelly, though the undersized animals produced in the latter places are generally well able to perform all the work required of them.

There is a very superior breed of cattle raised in the jungles reaching down from Alambadi, along the banks of the Kávéri. The Trichengode cows are also famous as good milkers, one of these costs from 30 to 40 rupees; a good pair of travelling bullocks from

Rupees 50 to 250 a pair, and at the latter price will do nine miles or more in an hour if pressed; ordinary ploughing cattle cost Rupees 25 a pair.

Coimbatore.—In this district there is a small sturdy breed of cattle, well-set in the carcase, an indication of strength. They are generally much tamer than most cattle, and do their own agricultural work very well. The cows are considered good milkers, and are preferred by some people for their small well-set frame. The bullocks fetch from 25 to 50 rupees the pair; and the cows, when in full milk, 25 to 35 rupees. There is quite a different breed in the hilly parts of the district, between which and the plains considerable trade is carried on. Coimbatore hill-cattle are of light build and show something of the Mysore breed, having long horns, somewhat of a pendant dewlap, and a graceful figure. They are bred successfully, but would no doubt be materially improved by the introduction of fresh blood, as they have good figures, size and endurance. At present they look lanky, without much stamina in bone or muscle. The prevailing color is white.

The native breeds of cattle procurable in this district are the North Coimbatore, the Mysore or Amrit Mahál breed, 54 inches behind the hump, Rupees 160 a pair, are middle-sized, compact, short-legged and very useful animals for either cart or plough.

The South Coimbatore or Kangeyen breed, 52 inches, Rupees 100 a pair, is still smaller, fine-boned, very compact, and for its size a most useful breed. A pair of bullocks of the above breeds, well fed, can draw the English plough and turn up 9 inches of soil. In single carts they can draw ½ a ton, or 108 gallon water casks singly, and in the double mote each can raise 6 tons of water daily. Milch cows get cotton seed and bean; cholum is the staple fodder of cows; they graze on waste land and have jungle or paddy-

field grass when procurable at nights. Cows are largely used to work the plough.

Malabar is not a cattle-producing country. The chief working cattle are imported from either Mysore or Salem, but there is a small wretched breed indigenous to the place, and these extend through Malabar and South Canara. The prevailing color is black; in form and shape they would resemble English cattle but for their diminutive size. They have fine thin necks, a small well-shaped head, and prominent sparkling eyes. With these exceptions, there is not much to be said of the breed. The damp moist climate of the places in which they are found and the want of proper food, pasture and shelter do not admit of their being improved. Rather than do this the natives prefer to import their working cattle from neighbouring districts. A pair of working bullocks, imported chiefly from Mysore, sells for from 80 to 180 rupees; those bred in the country, fit for the plough, from 35 to 50 rupees the pair. Milch cows from over the ghauts are sold for from 40 to 50 rupees each; the cows of the district, from 20 to 40 rupees each. Some fine cattle, small but greatly resembling Mysore cattle, are met with in the Palghaut division of Malabar. They are nice, graceful active animals, make good light draught as well as trotting bullocks, and are much esteemed in some of the adjoining districts.

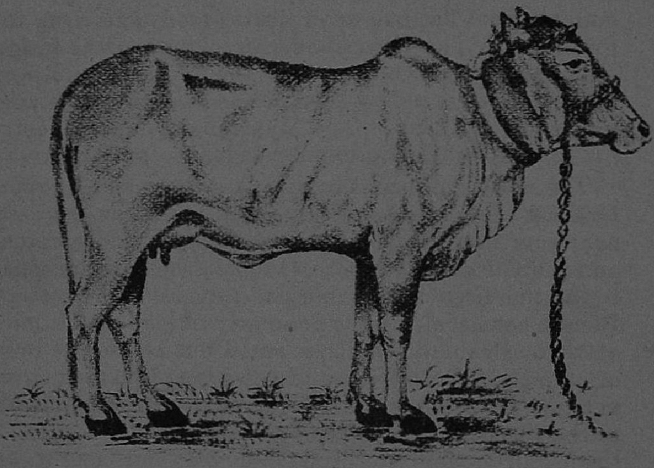
The bulls of Hissar in the Hurrianah District in the North-Western Provinces, are noted for their size; some were brought to Burdwan for crossing the local breeds of cows, but the experiment failed and the attempt was not renewed in any other quarter. The cattle employed at the Hurrianah establishment consist of the Nagpore, Guzerat, Ongole, Hurrianah, Scinde, and Mysore breeds. The qualities of the Nagpore breed are height, substance and speed; of the Guzerat, height, greater substance, but a duller disposition than the Nagpore. The Ongole has height and very great substance, can

endure great fatigue upon coarse food, and lives to a great age. The Hurrianah can endure great fatigue upon coarse food, but has not the height or substance of the former breeds. The Scinde has great substance, but is low and lazy. The Mysore is strong, and active for its size, but is too low for ordnance purposes.

The most successful crosses are from the Nagpore, Guzerat and Ongole tribes. The best draught cattle are from the Nagpore, Ongole, Guzerat, Hurrianah, and the Guzerat, Nagpore, Ongole; the latter promises to be the best crosses we have made. The cattle of Bengal consist of what is popularly termed the Humped cattle or Brahminy bulls, a small but handsome breed of animals. Both bulls and cows are often made great pets of by Hindus, and frequently prove a nuisance to the place. They appear to do the work required of them fairly well, in proportion to their height and strength. Surat in Kandeish produces a breed of large cattle something like the Nellore, except that they are much larger and heavier in make and carcase, with a dull heavy expression, large pendulous lop ears, and slow movements.

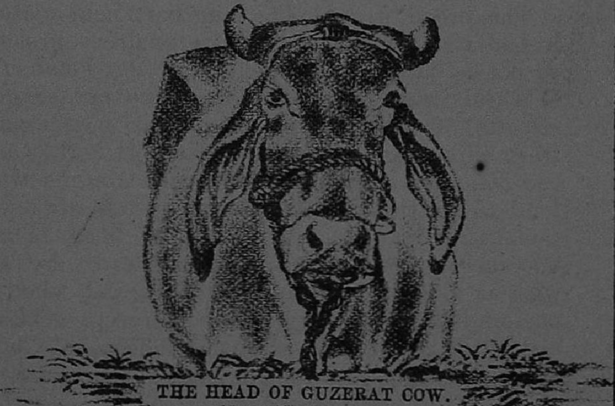
ADEN CATTLE.

This breed of cattle has long been held in estimation in India on account of its dairy qualities, first brought to notice through the medium of the Peninsular and Oriental Steam Navigation Company's passenger ships selecting them for supplying their passengers with fresh milk on board their steamers; thus they attracted the attention of some civilians of Madras who were fond of cattle, and a few bulls and cows were occasionally imported by some of them more than 30 years ago, and animals of this breed were to be met with at Coimbatore and Cuddalore, but when the importers left the country, the cattle were sold and got lost in the crowd. In 1857 the Collector of Cuddalore, Mr. Wood, had some good animals of this breed. What



GUZERAT COW.

The property of Basoova Pillay Avergal, Merchant, Madras.



THE HEAD OF GUZERAT COW.

The property of Basoova Pillay Avergal, Merchant, Madras.

G. Parkzansky, Lithog.

For Higginbotham & Co., Madras.

became of them when he left the country I cannot say. Recently the Government Farm authorities at Madras have drawn special attention to this particular breed, and in 1883-84 there were in the farm 5 cows, 3 heifers, 8 bulls, and 7 bull-calves; subsequently 6 cows with bull-calves at foot, and 15 young bulls were imported from Aden. A few bulls and some cows have been distributed to a few districts, and I believe it is intended to supply other districts as soon as more animals are available. I have myself now an Aden cow and bull. The Aden bulls resemble greatly the Brahminy bulls of Bengal with their huge humps, they are mostly hornless, and somewhat heavy-looking at the hump, 48 inches in height, and from the crest between the horns to root of tail measure 72 inches in length, the girth of carcase behind the shoulder 70 inches. The bulls I have seen at Aden worked fairly well in drawing the cart, but at the Government Farm the Aden cows are crossed with the "Poonganoor bull," with a view (it is said) of raising a better strain of working cattle than the Aden, without injury to the dairy qualities of the breed. The cows look small and light of carcase, and nearly all I have seen are either hornless, or have crumpled or short horns. They yield from 2 to 3 measures of milk in the 24 hours. The especial value of this particular breed consists in their tameness that Europeans or natives can approach and handle them without fear.

From the review taken of the cattle in India it will be seen that there are but two breeds worthy of special notice, and that these belong to Mysore and Nellore. Bulls from these breeds have been scattered all over India with a view to improve the cattle generally. The Nellore are often called Ongole bulls, but that is a mistake, as Ongole is the Sub-Collectorate of the Nellore District. The best animals for drawing loads or trotting in carriages or for agricultural purposes come from these. I have known them to trot in a carriage from

8 to 10 miles an hour. Some very fine animals possessed of great strength, endurance and speed have been secured among our karkhana cattle, which are sometimes designated Hunsur bullocks. Unfortunately the want of pasture lands in most districts of this Presidency, and the indifference of the ryots or cattle-breeders, who fail to raise special fodder or pasture for their cattle, present obstacles to improvement. Even the straw raised with their grain is frequently used by villagers to thatch their huts and for other purposes, instead of being stored for the use of their cattle during seasons of scarcity.

From the Hindu worshipping the cow, he never thinks of fattening it for purposes of food, nor does he appreciate high-farming or stall-feeding of stock to improve both his stock and his land, the cattle-droppings being generally converted into fuel instead of manure. To the generality of natives a calf is a calf no matter what sort of an animal it is. Should it prove to be a male it will suffice for their purposes eventually to scratch the soil with their crooked plough; or if a cow-calf, it will breed, and perhaps not only give them another calf but a little milk also; and why, they argue, should they trouble themselves about improving their cattle, which will cost money when they have none to lay out, while, by following the practice of their forefathers, things take their natural course. The native never thinks of castrating his male calves at a tender age. In Europe, calves as a rule are castrated between the first and third month of birth. At one time they were not operated on till they were two years old, but the former rule is now in general practice. The advantage of the operation at this early age consists in the improvement of the animal in form, size, propensity to fatten, and in the quality of the meat, while it also renders him docile and generally useful as a working bullock. The native, on the contrary, waits till the animal attains five years of age, that is,

sheds six of his milk teeth and they are replaced by permanent ones. As soon as this takes place the bull is castrated without any cutting being resorted to. The animal is thrown and fastened down and the scrotum drawn out and freely handled for a few minutes to relax it; then two stout wooden rollers about 15 inches in length and $1\frac{1}{2}$ inch in diameter are tied tightly at one end, and passed between the scrotum containing the gland, and the body of the animal. One gland is next pushed up towards the abdomen, and the other retained in the scrotal sack, the rollers being drawn and the free ends tied together. A man sits in front and presses the gland tightly against the rollers till the gland bursts within its sack in the bag of the scrotum, when he seizes the broken gland between the fingers of both his hands and kneads it well till it becomes broken up into a soft pulp. The other gland is next drawn down between the rollers and crushed in like manner, and a little cow-dung is lastly smeared over the scrotum. At the same time, with a sharp bamboo or wooden needle carrying a cord a quarter of an inch thick, he perforates the cartilage between the nostrils, and fixes the nose-string, and having secured it over and at the back of the horns, puts a cord round the animal's neck as a collar, to which the nose-string is loosely tied, and the animal is then let loose. No further treatment is ever necessary, and I certainly think well of this mode of operation, for the animal is well in a week and put to work. There is no wound with subsequent inflammation and discharge as is the case after cutting. The scrotum swells, and in ten days or a fortnight the whole gland becomes absorbed, and the empty sack remains. The process is also never attended with danger, nor does it appear to me to be painful as compared with the cutting process. So pleased was I with it that I have since operated on a pony after this plan, and with success. The animals further retain their masculine form to a certain extent;

and the only disadvantage that occurs to me as against these advantages is the bare possibility that, if any portion of the gland is not thoroughly crushed up, the animals may occasionally prove troublesome among cows.[1]

The evil of this late castration consists in the young bulls being allowed, before it takes place, to roam at large with herds of cows; and, as the native breeder or village herdsman never thinks of segregating his cows from the bulls, even if there be a good bull in the herd, he is often over-reached by these young animals from their lightness of carcase and activity in serving the cows. In Madras, on the esplanades, this may be witnessed any day among the cattle grazing there; and the herdsman himself, as soon as he finds that a cow is in season, generally ties her down and encourages the younger animals frequently some good-for-nothing two-year-old bull to serve her, in preference to a larger and better animal which is slow in his movements, for all the herdsman cares about is to ensure the conception of the cow. Several gentlemen about Madras have good English and other bulls whose services may be obtained for the asking; but the native, although aware of the fact, will not avail himself of the advantage, as it will entail labor in taking the cow thither and bringing her back. Natives for the most part give their best attention to bull-calves, for conversion into bullocks. The rule is for a ryot or other agriculturist or cattle-breeder to select or purchase a bull-calf to make a pet of. After awhile he finds a match for it, and the pair have frequently fancy rope halters put round their necks, and are led

---

[1] The imperfection of castration by the crushing method by natives, does not detract from the merits of the operation which for simplicity and utility excels the cutting process. It can and has been practised with greater facility, and is as perfect in result as cutting with the knife, every vestige of the testicles being removed by absorption. This is greatly facilitated when the animals operated on are young.

about. While the owner pursues his own occupation the calves are allowed to brouse in the vicinity, and before they are taken home, either the ryot himself or some member of his family goes into the neighbouring fields and cuts a good bundle of green grass for their use at night, while the ryot's wife secures all the refuse rice or raggi pottage after the family have finished their meal, and all the washings of rice conjee-water, and puts them aside to be given to the calves. If the ryot cannot go out himself, either his wife or some other member of the family leads the calves out daily to feed among the bunds that divide the rice fields, along which good fresh *Hurrialli* grass is to be found, tender and green, and, while the animals are feeding, the person in charge secures a bundle of green grass for them; besides which, they receive handfuls of cholum or raggi stalks or straw now and then, and this is always the best the ryots can lay hands on. As the calves grow older, they get a little cotton seed, oil-cake, rice, bran, &c. The animals are tended with the greatest care and affection till they are about five years old,[1] when they are castrated and trained to the yoke, that is, if they turn out good promising animals; but should they simply prove to be working cattle, they are put to the plough at three years and kept at light work, though they are seldom or ever castrated before they are five years old. If intended for breeding-bulls, the ryots begin to use them when two or two and a half years of age. In my opinion the men are

---

1 The practice of petting bull-calves is rather the exception than the rule, and is chiefly restricted to parts of Mysore though I have seen a few instances in the districts of Nellore and Cuddapah also. In Mysore, it is the Canaras and Mahrattas, and in Nellore and Cuddapah, the Reddies chiefly who practise it. Frequently either one or a pair of bull-calves is looked upon as the fortune of the family, and perhaps a marriage is dependent on the proceeds realized from their eventual sale. Should they not realize the owner's expectations as to size and quality, the animals may not nevertheless be sold, but are retained as plough bullocks.

right in concentrating all their attention on the bulls to the neglect of the cows, although I see, from the reports on the Adanki cattle-shows, that the Committee bewail time after time the systematic neglect of the cows by the ryots or breeders.[1] Cows need no special care : of course it is well that they should get sufficient food to keep them in fair condition, and that is all that is required, as their influence only extends to one calf yearly, whereas the bulls when properly tended and cared for, can and do serve from 80 to 100 cows during the year. Their influence on the progeny is thus great and extensive, much more so than that of the cows; and all judicious breeders should therefore I think give the greatest attention not only to the selection but also to the food and care of bulls, if they wish to improve their stock as a whole.

To show how indifferent the natives are as regards the improvement of their cattle, I have only to relate that a few years ago, being greatly interested in the improvement of the cattle in the district in which I was then located, I selected a good medium-sized English bull, just the stamp of animal for the improvement of the small and indifferent breed of cattle so frequently met with in most districts of this Presidency, and notified that he was at the disposal of any one who chose to take advantage of him to serve his cows. Not a single individual came forward, and as I had to leave the country shortly after, the village Magistrate offered to take charge of the bull, and do all that was required in the way of food and care. But to my regret, on my return to the station 16 months after I found the bull was dead, and soon learned that after a short time the village Magistrate got tired of feeding the animal, and the villagers refusing to assist,

---

[1] If ryots are obliged to feed their cows in the same manner as they do their bulls, they can never afford to keep more than one or two animals, which would never pay. All that is required is ordinary care with plenty of food.

he was let loose to pick up what he could with the country cattle, and before three months elapsed he died. Some time after, I purchased a second bull, a cross between the English and Nellore breed, and let him loose among the village herd, feeding him myself; but the natives took no interest in him, and I more than once caught the cowherd forcing his cows to receive the miserable two-year-old animals of the country, his only excuse being that my bull was too sluggish to suit country cows. On leaving the district the bull had to leave also.

Attention is never given by the ryot to the improvement of his cattle so as to bring them into early maturity, so that it takes a heifer from four to five years to produce her first calf, whereas if the necessary attention were given them in the way of proper food and care, there is no doubt whatever that many would produce at two years, which would prove a great saving in the matter of keep.[1] As however, in the majority of instances, it costs a native little or nothing to keep his cattle, early maturity never troubles him: had he to pay for the keep of his heifer for four or five years before getting a calf from her, concern would follow as a matter of course. I have had a calf from a heifer at the age of 27 months, and know of a few other similar instances, but this, instead of forming the exception, would prove the rule if more attention were paid to the subject. Two heifer cows with

---

[1] That heifers do not attain to early maturity is well known to the natives generally. It is not condition that promotes maturity so much as other attendant circumstances. Experienced natives affirm that high condition interferes with heifers coming early into season, and resort occasionally to the plan of reducing their size if too full. "If the period is prolonged after three years, and especially with good keep, the animal (heifer) will often be in too high a condition and there will be much uncertainty as to her becoming pregnant." "*Note.*—When heifers of this age will not stand their bulling, a couple of doses of physic, or the turning on shorter pasture until they next come into season, will set all right." *Vide* page 526, Cattle, their breeds, management and diseases, by William Youatt.

calves at their heels under two years old, of the Nellore breed, have since come under my notice. (It is much to be regretted that from recent reports, the Collector of the district of Nellore appears to be opposed to cattle-shows, and that too in the face of an improvement said to be evidenced in the young cattle exhibited, such improvement being no doubt the result of the shows themselves. On the other hand, it is satisfactory to observe that both the Board of Revenue and the Government direct the continuance of the shows. In my own humble opinion, cattle-shows have done immense good, if not in a direct, certainly in an indirect way, and they should not only be continued, but extended to other districts also.) These cattle-shows in the Nellore District appear to have been discontinued altogether now.

It is not possible that any one individual can improve the breed of animals in a whole country. To do so requires several generations, generations too of individuals who are fully and pecuniarily interested in the matter, and altogether from first to last it is uphill work. Some one individual may perhaps take an interest in stock-breeding, and get together a number of improved animals; but the moment he dies or leaves the country the cattle are all sold and dispersed, nor is anything more heard of them, the little improvement effected being lost by subsequent bad feeding and want of care. I do not believe that under existing circumstances the cattle of this country can be improved at all. Most districts are deficient in pasturage for the greater part of the year, and invariably no attention is paid to breeding or selection of stock, and no food grown specially for the use of cattle. What is required before the introduction of superior breeds or varieties, is that abundance of good food, both as green food and fodder, should be grown expressly for the purpose, and provision be made for good suitable pasturage in every district. Then it will soon be found that in a

few years even the present diminutive miserable breeds will develop into superior animals. Not only should special food be grown, but cattle should be carefully housed, well fed and tended. The bulls should be isolated from the cows till their services are required, and all males not required for breeding should invariably be castrated before they are six months old. Under such a system I have not the least doubt but that India will produce stock that will stand comparison with the stock of England or of any other country.

To recapitulate:—the best and most useful breeds of cattle come from,—1, Mysore; 2, Nellore; 3, Salem; and 4, Poonganoor; and the best milch cows are to be had in Nellore, Mysore, Coimbatore, Poonganoor, and Salem.

Age.—The age of cattle is generally estimated by the growth of the permanent teeth, and also by the several rings that form round the horns. Each year is supposed to add a ring or circular mark to the horns; but in calculating age by the rings, allowance should be made for three years, as it is only after the third year that the circle on the horns becomes defined; when an animal has six rings it should be pronounced eight years old. (*Vide* plate.) Of the two systems, that of judging by the teeth is by far the more reliable.[1] Even with this system however it is difficult to tell the age of a calf before it sheds two of its central milk teeth; and again there is a difficulty when the animal completes teething at the fifth year. At six years of age the eight permanent teeth are completed and attain a uniform level, and the mouth is said to be completed,—literally what the native calls "Vayee coodoogurathu," when the animal has attained its prime. After this, the animal is supposed to decline or approach age. After the sixth year all is guess-work, and nothing can be affirmed decidedly.

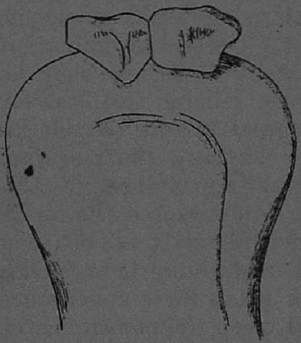
---

1 *Vide* a series of 14 plates showing teeth at different ages.

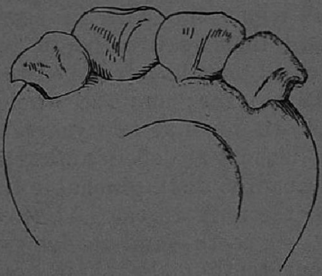
Those however who have had extensive experience with cattle, assign age even subsequently with tolerable correctness. Careful examination of the teeth, and of the extent to which they have been worn down, (a not very reliable test, as the wear of teeth depends to a great extent on the kind of food the animal has been having), the markings of the horn, and the general appearance of the animal itself frequently help to determine the question. At birth there are two central milk teeth or incisors in the lower jaw, the upper continuing bare. During the second week four teeth make their appearance; in the third week, six; and when the mouth has been completed, eight milk teeth are established. After this the age is generally told from the wear of these milk teeth which begins when the calf is six months old. The two central incisors first begin to give indications of wear at 12 months; four teeth at 15 months; six teeth at 18 months; and the whole of the eight teeth are well worn down at two years, when also two of the central incisors are shed and replaced by permanent teeth, readily distinguishable from their size and form from the milk teeth. At three years, four teeth—at four, six teeth—and at five years the whole eight permanent teeth make their appearance, and complete the mouth as has been intimated. At six years of age these in their turn commence to wear. The natives of India are thoroughly conversant with this method, and many of them are shrewd clever judges as to the age of cattle. Cattle—bulls, bullocks, and cows—attain to a good age when taken care of, and the fecundating powers of bulls and cows are retained for a long period. The cow breeds when a year old and continues to breed up to twenty years; the bull is used as a yearling. Sometimes he is used earlier, but this is ruinous; if he could be left to three years of age it would pay in the offspring.

It may not be generally known that grand cattle-

To face page 33, 34. PLATE 8.



BIRTH.



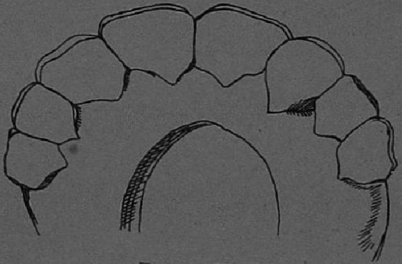
SECOND WEEK.

THIRD WEEK.

G. Packzensky, Lithog. For Higginbotham & Co., Madras.

To face page 33,34.

PLATE 9.



FOURTH WEEK.

EIGHT MONTHS.

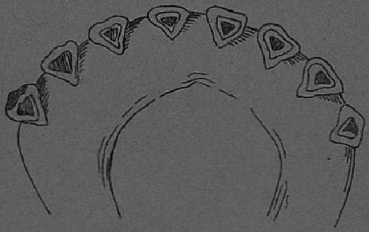
ELEVEN MONTHS.

G. Pb·kzemsky, Lithog.

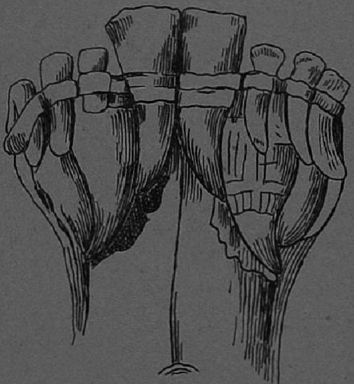
For Higginbotham & Co., Madras.

PLATE 10.

FIFTEEN MONTHS.



EIGHTEEN MONTHS.



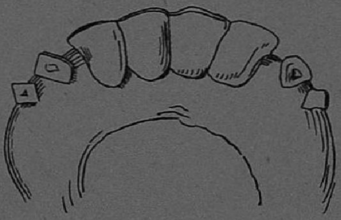
TWO YEARS.

G. Packzensky, Lithog.

For Higginbotham & Co., Madras.

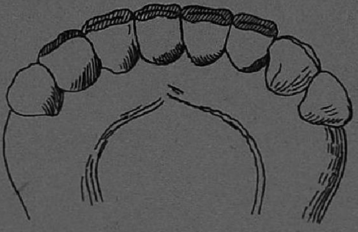
To face page 33, 34.

PLATE II.



THIRD YEAR.

FOURTH YEAR.

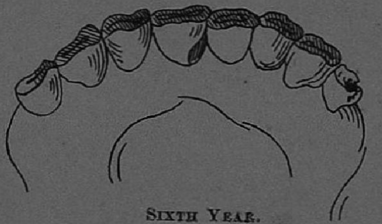


FIFTH YEAR.

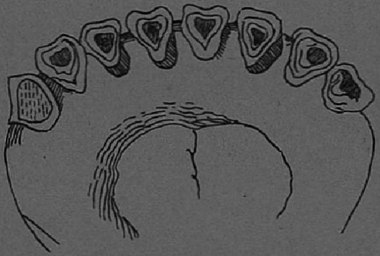
G. Packrensky, Lithog. For Higginbotham & Co., Madras.

To face page 33,34.

PLATE 12.



SIXTH YEAR.



TENTH YEAR.

AGE SHOWN BY RINGS FOUND ON THE HORN.

G. Packzensky, Lithog. For Higginbotham & Co., Madras.

fairs or markets are held annually during the principal Hindu festivals or Juthras, in the principal towns such as Teroonamally in South Arcot, Strirungum in Trichinopoly, Madura in Madura, Tripethy in North Arcot, and Humphy in the Bellary District. On like occasions other districts also hold cattle-fairs when young and promising stock are brought from great distances for sale, with the double object of celebrating the festival and of finding a sale for the cattle. This is well understood by natives generally, and no notices or advertisements are ever resorted to to make the places known. I have visited some of these fairs. In Madras, milch cows and cattle generally stand for sale at *Puliam* tope or the Tamarind tope at Perambore between Cook's and Farran's roads. To tell the weight of cattle :—Measure round the animal close behind the shoulder, then along the back, from the fore part of the shoulder blade to the bone at the tail. Multiply the square of the girth by five times the length, both expressed in feet. Divide the result by 21, and you have the weight of the four quarters in stones of 14lbs.

Thus, if the girth be $6\frac{1}{2}$ feet, multiply it by $6\frac{1}{2}$, making $42\frac{1}{4}$ feet—then if the length be $5\frac{1}{4}$ feet, multiply by 5, making $26\frac{1}{4}$ feet; next multiply the results $42\frac{1}{4}$ by $26\frac{1}{4}$, and you have 1109 1-16th, this divided by 21, gives 52 stones, 11lbs. as nearly as possible.

In very fat cattle the weight is about a twentieth more than that ascertained in this manner, while very lean ones weigh about a twentieth less. The quarters are little more than half the weight of the animal. The skin weighs about the eighteenth, and the tallow about the twelfth of the beast.

The substance of the above is taken from an essay for which a prize of 100 rupees was awarded at the last Agricultural show at Sydapetta in 1874.

NEAT CATTLE.

The names given to cattle are as follows; a new-born animal of the bovine genus is termed "a *calf*," the male "a *bull-calf*," and the female "a *quey*," "*heifer*" or "cow-calf;" a gelded male is called a "*stot-calf*" or simply a calf, till one year old when it is termed "a *yearling*." When a quey bears a calf she is called "a *cow*," which name she retains ever after. A bull at 4 years is said to be "*aged*," and when castrated a "*stot*" or "*steer*" according to his age till 3 years old, after which he is styled an ox or bullock, which name is never changed.

A cow or quey that has received a bull is said to have been *served* or *bulled*. A cow that has not conceived or that miscarries her young is an "*eill*;" and one that has ceased milking is a "*yeld cow*;" when in milk it is termed a "*milk* or *milch cow*." Cows seldom bear more than one calf at a time, but if two calves should be born at one birth they are termed "*twins*," if three, "*trins*."

In early maturity a heifer may be a mother at two years, but this is an exception, as Indian heifers seldom come into season before the fourth, and frequently not until the fifth or sixth year. Cows may be ascertained to be in calf about the 5th or 6th month of gestation.

The calf is supposed to quicken between the 4th and 5th months. It may be felt by thrusting the points of the fingers against the right flank of the cow, when a hard lump will bound against the abdomen and be felt by the fingers: or when a bucket of cold water is drunk by the cow, the calf kicks, and a convulsive motion may be observed in the flank by looking at it from behind; if the open hand is then laid upon the space between the flank and udder this motion may be distinctly felt. As time advances the fact will become self-evident from the size of the abdomen, nor is there really much necessity for testing

a cow, for if she is not in calf she will soon seek the bull, and if she does not for some months, you may be sure that she is in calf.

Medical men can more easily ascertain the fact by examining the womb, but this practice should not be resorted to, as it may promote abortion.

The application of the ear or stethoscope to the flank of the cow will detect the pulsations of the fœtal heart as early as six or eight weeks after conception. The stethoscope is an invaluable instrument for the purpose, but in the absence of one, the ear itself may be applied to the flanks of the animal. In such cases, the best thing to do is to make one's self familiar with the beatings of the heart of the cow herself first, at the left side of the chest near the elbow, and then to place the ear or stethoscope to the flanks, beginning with the right; the sounds of the fœtal heart, the most certain and positive sign of pregnancy, cannot be mistaken if a fœtus exists.

A cow carries her young for 9 months or 273 days. It may sometimes be only 250, and sometimes extend to even 300 days, but the average may be put down at 285 days, and any calf born before that time should be considered premature.

Four or five weeks after calving the cow will seek the bull again; in India however it takes from 6 to 9 months ere she comes into season. This is the case more especially with the large breed of Nellore cows, which are invariably late, milking for about 9 months before they are ready to receive the bull, and continuing to do so for about 3 months longer, after being "served," thus milking for about a year altogether, and producing a calf once in every 18 months, and sometimes in 2 years. Good milch cows of the Nellore breed are reputed to yield 24 quarts of milk in the 24 hours. Repository keepers in Madras often advertise such animals, and invite the public to witness the process of

milking. My personal knowledge is limited to 18 quarts (each quart measuring 24 ounces) in the 24 hours, though the average may be fixed between 6 and 12 quarts according to the make and size of the animal.

The small-sized cows of Salem, Coimbatore and other districts frequently come into season in the 3rd or 4th month after producing their young, and many are known to produce a calf every year, and to yield milk for 6 out of the 12 months. Cows may be milked to within a month or fortnight before calving; but if kept in milk all this time, there may be an interference of the old with the new milk or that which has to be secreted for the forthcoming calf, and it may also interfere with the proper nourishment of the calf the cow is carrying, unless she is highly fed. All circumstances considered, it will be best to give the animal a respite of 3 months before she calves, which will allow time for the drying up of the old milk and give a short rest to the system before the new milk is secreted. An instance recently occurred among my cattle. An half-bred cow (English and Nellore) had been milking for 17 months continuously, and to the surprise of the cowman she gave a measure of milk in the evening and produced a cow-calf the next morning. She was not suspected to be in calf all the time, so that she has been continuously in milk now for 23 months from the dropping of her first calf whilst her second calf is 6 months old.

The symptoms of coming into season are abatement of milk and restlessness. If in the field, the cow will be riding other cows, and frequently dunging, staling and bellowing; her tail will be in constant motion, and she will have no appetite. The external parts will appear red and inflamed, and a transparent discharge may flow from the vagina, which may continue for a couple of days, though generally it lasts for 24 and sometimes for only 4 or 6 hours. These symptoms return once in about every three weeks.

A cow should not, as a rule, be put to the bull till 3 months after the birth of her last calf, as the womb during that period is mostly in a relaxed state and incapable of retaining the seed, consequently she seldom conceives if she should take the bull before the above period has expired. Young heifers and some cows are skittish and may not stand the bull at first. The natives generally force cows to receive the bull; on such occasions they frequently get one or more two-year-old bulls and try to excite one against the other to serve the cow rapidly. This practice should be reprobated.

The most natural way is to allow the bull and cow to please themselves, and to leave them alone; the proper time being then chosen of their own inclination, conception is ensured. In many instances, either from difference of size or other circumstances, they may require assistance; nothing more however is necessary in such cases than choice of ground, and 1 or 2 thorough skips are ample to secure conception.[1]

ABORTION or MISCARRIAGE.

The cow sometimes aborts her young, and this may happen at any period between the 1st and 7th months of pregnancy. When it occurs between the 7th and 9th months, it may be reckoned a premature birth, as the young animal brought forth may live and be capable of independent existence.

The indications are,—the cow grows dull and listless all of a sudden; she does not chew her cud; if she is in milk the secretion is arrested, and the udder grows lax and flabby; and if not in milk, and the period of gestation exceeds from 3 to 5 months, the udder suddenly swells and fills with new milk; the rotundity of the abdomen is lost, and the abdomen subsides, and a

---

1 These names and particulars are chiefly gleaned from *The Book of the Farm*, by HENRY STEPHENS, F.R.S.E.

reddish glairy fluid exudes from the vagina, this last being perhaps the most certain sign of impending trouble; shortly after, labor sets in, and the animal struggles through much pain and agony ere she gets rid of her burden.

The cause of abortion may be sudden fright, or accidents resulting in falls, or bruises or blows on the abdomen. Sometimes it is caused by being teased by the bull or some semi-castrated animal, or by great fatigue or violent exertion from being over-driven. Malformation or disease of the generative organs may also in rare instances bring on miscarriage.

The treatment consists, if the abortion is detected at an early stage, in perfect segregation, quiet and rest, and cold application to the loins and haunches, with a mild aperient of from 2 to 4 ounces of epsom salts in a pint of rice-gruel. But should the discharge appear fetid, it indicates the death of the fœtus, when rest and quiet are needed, with mild stimulants in the shape of a dose of from 2 to 4 ounces of country arrack, in a pint or two of warm rice-conjee, 2 or 3 times a day, to promote contraction of the uterus, and enable it to expel its contents quickly. In these cases the after-birth is always slow in appearing, and the earlier the miscarriage, the greater the tendency to retention in the uterus, which evidently becomes decomposed and comes away piecemeal. Great attention to cleanliness, and the free use of carbolic acid oil (1 to 20 parts), and light nourishing food will be found to go far towards restoring health in such instances. When a cow gives indication of approaching abortion, she should at once be completely isolated, and not allowed to approach or mix with other cows till she is quite well and thoroughly cleansed and free of all discharges, as there is a great tendency to sympathy being communicated readily to other pregnant animals, resulting in abortion, occasioned chiefly by the smell from the discharges. Sometimes this evil continues as an endemic

affection among particular herds. Cows that have once aborted, will always show a tendency to miscarry at the same period of gestation every time they become pregnant, and require therefore to be attended to carefully. They should be kept perfectly at rest, a mild aperient or two should be administered when necessary, and strict separation should be maintained till their *full* time approaches.

CALVING.

Little requires to be done before a cow calves, beyond attending to her food, rest and exercise. As the period of calving approaches, the abdomen first increases in size and rotundity and then subsides somewhat and the udder springs out and becomes distended with new milk day by day for the nourishment of the forthcoming calf. Some animals evince uneasiness and irritation of the bowels and bladder, by the constant motion of the tail, and by the ineffectual attempts made to dung or stale; the vagina becomes loosened and increases in size, and a white or pale straw-colored glairy discharge exudes from it some 2 or 3 weeks before the time. As labor begins to set in, the animal grows restless and uneasy, and the actual progress of labor now becomes evident by the protrusion of the membranes or the bag of waters as it is termed, which breaks; the animal lies down, and after a while turns flat on her side, generally the left. The fore feet of the calf may now be seen protruding through the vulva; and as labor advances, the head comes forth closely applied over the fore feet with the chin resting on the knees, and the back of the calf parallel to that of the cow. After the head makes its appearance there is a short respite of some 2 or 3 minutes, and the trunk and the hind extremities stretched at full length are then pushed out by the expulsive efforts of the uterus assisted by the diaphragm and abdominal muscles. A few minutes after the birth of the calf, the cow sits up, and

then rising on to her legs commences to lick her calf, which she does incessantly for some time, the calf the while lying still, stretched out and gasping. Gradually it raises its head, draws its fore feet under it, and begins to make ineffectual attempts to get on its legs, which it eventually succeeds in doing. It then totters about, by degrees attains firmness on its legs, and after a short time is able to support its body steadily. In the great majority of instances no assistance whatever is necessary, nature accomplishing her course with perfect safety to mother and young. Occasionally a cross-birth may occur, and not only manual but mechanical assistance be needed. In these contingencies, it is best to have recourse to professional assistance if available.

In India the majority of cows are left to nature, but if the animal is a valuable one or a pet cow, well-to-do natives prepare a gruel of cumboo to which some palm sugar is added, and when procurable, a calabash or bottle-gourd is cut up and boiled with the cumboo to form the gruel, which is given to the cow for the first three days; others also give the animal a warm bath. The bath is prepared by boiling a variety of leaves such as mango, tamarind, neem, guava, &c., and the decoction thus prepared is poured while tepid over the loins and hips of the cow for the first three days. From the fourth day after calving she receives special food to increase her milk, which will be noticed presently.

INVERSION OF THE WOMB.

Some cows are subject to inversion of the womb, caused by the convulsive efforts made to expel the fœtus, so that with the fœtus the womb is also thrown out, and hangs between the hind legs of the animal, extending down to the hocks in the form of a large red bag. When this occurrence is noticed, no time should be lost in returning the womb to its position, after having first cleaned it of any foreign matter that it may have come in contact with. If allowed to continue hanging,

the whole womb may mortify and fall out. The cow is generally so very restless, and the expulsive efforts of the womb are so violent, that no sooner does the womb get into its position than it is thrown out again and again. A drench containing 2 ounces of laudanum should be given to the patient at once with rice-gruel, and 2 ounces of laudanum with 6 or 8 ounces of cold water should be injected into the womb so as to control the spasms. Should the stomach, more especially the rectum, be distended, efforts should be made to empty it, and purgative medicines should be given, and large quantities of warm water thrown up the bowels, to act as a fomentation and soothe and allay the expulsive efforts of the womb, as also to clear out the bowels. No force should be used in attempts to return the retroverted womb, but it should be gently and carefully pushed up by a process of kneading till the whole is up into the pelvic cavity, and there it should be retained by the hand for a time till the spasms begin to subside, when the hand may be gently withdrawn.

The native treatment consists in making a circular ring from a piece of cane bark, 3 or 4 inches in diameter. This is passed into the pelvic cavity with the return of the womb, and is there fixed by impinging against the bones of the pelvis, for 6 or 12 hours; the cow is further driven immediately into a tank or pool, and made to stand up to her flanks in water for some considerable time. On the subsidence of the spasms, the cane ring is removed from the pelvis, and the animal is brought out of the water. I have seen this plan tried successfully. The cow should be kept quiet and confined to her stall, and have a feed of warm rice-gruel given her for a few days.

AFTER-BIRTH or PLACENTA.

The placenta will come away in from ½ to 4 hours from the dropping of the calf. It is necessary to have a man to watch the cow till this after-birth drops, and

to remove it away immediately to some distance and bury it carefully, for the cow may be tempted to eat it if left anywhere near her. Some cows do eat the after-birth when it is not removed, and such animals are said to fail in the yield of milk.

The natives frequently take the after-birth and place it on a milk-hedge, and then beat the hedge with a stick, so as to break the branches and cause a flow of milk to fall on this viscus. They believe that by so doing the cow will give large quantities of milk, but it is a fanciful superstition and need not be noticed.

MILK or PUERPERAL FEVER.

Cows, soon after calving, are sometimes subject to fevers, occasioned by the great excitement produced in the system from the emptying of the womb and the rush of milk to the udder, which tend to cause a general as well as a local disturbance. Fever may also be occasioned by cold and wet immediately before, after, or during parturition. Some cows are subject to the disease more than others, more especially those in high condition. The disease may show itself in the course of the same day after calving, or it may not be observed for several days after. The first indications are that the animal becomes restless, tries to ease herself by shifting the weight of her body from one hind leg on to the other, and droops on either leg alternately. She gets startled, the breathing becomes hurried, the flanks heave, the mouth opens, and saliva flows from it. After a time the cow staggers, and, unable to support herself any longer, lies down, when the body begins to swell, the extremities grow cold, and there is a general shivering with cold perspirations and irregular pulse, terminating in death.

In all such cases prompt treatment is necessary. The cow should be bled to the extent of 3 or 4 quarts if in high condition, and an aperient of from 1 to

$1\frac{1}{2}$lbs. of epsom salts (according to the size of the animal), should be dissolved in a quart or two of rice-conjee and administered with an ounce of ginger. If this does not act in the course of 12 hours, the salts may be repeated in $\frac{1}{2}$lb. doses every 6 hours, until the bowels are opened. An enema or clyster should also be injected, of warm gruel a couple of quarts, with from 4 to 6 ounces of castor-oil and an ounce of soap. As soon as the bowels begin to act a bucket of weak rice-conjee should be given warm, and as she recovers and shows an inclination to eat, she should be cautiously indulged with her usual food.

RED WATER.

This is also a disease that shows itself after calving, and is dependent on the subsequent cleansing of the womb if from any cause the natural discharge is not free. The urinary organs get irritated, the cow strains frequently, and passes urine in small quantities tinged with blood, whence the characteristic name of Red Water given to the disease. If it continues, the secretion may become black or of the color of ground coffee. The discoloration is occasioned by a vicarious discharge of the uterine secretion, attended by constipation and imperfect digestion, and if not carefully looked to, the animal will die.

Give at once from 1 to $1\frac{1}{2}$lbs. of epsom salts with an ounce of nitre and another of ginger, in a couple of quarts of rice-conjee; keep the cow quiet, give her drinks of conjee-water or a decoction of linseed, and attend to the bowels.

MILKING.

The milking of cows seems a very simple process, but to do it successfully and correctly, without pain or annoyance to the animal, is the secret, and requires experience. A model udder should be of moderate size, proportioned to the size and form of the animal.

The teats should be situated at regular distances, of proportionate length, and of equal thickness from base to point. They should be well apart, and when stripped, should yield milk readily and freely, and not require forcible pulling. Immediately after calving, the teats will be found plugged up with a resinous substance, which will however disappear by the suction of the calf. The milk yielded for the first 4 days has been called "*Beistyn*" by the Scotch, and in India the natives term it *pus milk*, from the coagulable properties it possesses, and from its being thicker than natural milk and having a yellowish color. When boiled it coagulates into a thick substance forming curds, and on this account is never drawn by many people, but left for the calf. Natives however draw the milk and use it freely, looking upon it as a luxury. Before milking, the cow has her food, such as oil-cake, cotton seed, &c., placed before her in a basket, and her hind legs are hobbled to prevent her from moving about, kicking, or otherwise giving trouble. The calf is also allowed to suck her for a few seconds to enable the milk to flow, and as soon as an indication of frothing becomes apparent in its mouth, it is withdrawn, and tied by its neck to the near or left fore leg of the cow, on the same side as the milkman, who, seated on his haunches, begins forthwith.

Milking may be performed in two ways, by *stripping* or *nievelling*. Stripping consists in seizing the teat at its base with the two fore fingers and thumb, and drawing the latter down to the end of the teat, pressing it lightly so as to bring away the milk it contains.

The milkman smears the teats with a little milk occasionally, to enable his fingers to glide rapidly over the teats, and the process is generally conducted with both hands, by holding the two foremost teats one in each hand. In this way a cow can be milked quickly, the milker raising his hand as soon as it gets to the end of a teat, to reach the base again, and repeating

the operation till the teat is emptied. When the two nearest teats have been exhausted, the two posterior ones are seized in their turn and emptied of their contents, till the work of milking is completed.

Nievelling as it is called, is effected by grasping the teat with the hand and compressing it against the palm with the fingers, to drive the milk out, and then relaxing the hold to allow the teat to re-fill again, so that by a quick succession of contraction and relaxation by both hands, alternately, one teat in each hand, the milk is soon exhausted from the udder. The milk pail may be a chatty, a brass chemboo, or a tin can : the last is the best, as it can be made cheaply and of proportionate size, sufficiently large to contain the milk of each cow, and to be held conveniently between the knees. Every milkman prefers his own method of drawing, and it is no unusual thing to see a man use both stripping and nievelling on the same cow in the course of one single operation, habit having much to do with the practice. As soon as the cow has been milked, the calf is let loose, and the hobbles are removed from her hind legs. During milking she is intent on munching her food.

The cow in India is rarely if ever milked oftener than twice a day, between the hours of 6 and 7 A.M. and 5 and 6 P.M. daily. A certain quantity of milk should always be left for the calf, and the milkman when allowed to do so will regulate the quantity to a nicety : it is always best therefore, for this and other reasons, to have the same person to do the work on each occasion. Some cows will not also allow a stranger to milk them, and if they permit it, will not yield the regular quantity of milk. All cows should invariably be treated with kindness, and be coaxed with food, to enable and induce them to yield their milk freely ; no rough treatment should be permitted. The calf after sucking should be allowed to be with the dam for two or three hours, and then taken away and tied. It

should be served with tender grass if procurable, and should also have some of the cake or other food given to the dam at milking-time.

MILK.

The quantity of milk obtainable varies considerably according to the breed of the animal, the kind of food it has been having, and the time after calving. Hay, grain and oil-cake and green food improve the quality and increase the quantity of milk. The seasons and frequency with which the cows are milked also affect the supply. When cows are milked once or twice a day, the secretion is richer and contains more butter than when milk is drawn oftener. Morning-milk is richer than that drawn of an evening, and the last drawn milk at each milking is always richer without reference to time or season than the portion first drawn. The kind of water affects the flavor of milk. In some breeds the milk has a yellowish tinge more or less intense, and the richness of butter also varies. A good English cow will yield one pound of butter per day. A cow that is not with calf gives better milk than one that is carrying her calf. A well-formed healthy cow will give more and nicer milk than a deformed or sickly animal. Light-colored cows are popularly believed to be better milkers than dark or black or reddish-brown, but their milk is not so rich. Climate affects the yield of milk as transpiration is greater; cold is objectionable. More nutritious milk can be procured from cows that are tied up and fed than from those allowed to pasture at large. Milk is always at its best when the cow is of a proper age, that is about five years, and in good health. Neither young or old cows give much or rich milk. A cow is said to be in her prime after her third calf, or when the animal is about 5 years old, when the organs of secretion are fully developed, and it will continue a good milker till about 12 years old when with age the supply decreases. The milk of a cow is not good

when she is in season, or near her time, or has lately calved. The milk of a cow after calving is not considered to be in its normal state for ten days. At this stage it is called colustrum. It contains no casein, turns rapidly, but does not acidify. Milk is a watery fluid holding in solution albumen and oil, by the agency of an alkaline salt or a pure alkali, and having suspended in it an immense number of globules, which are in part albuminous and in part oily. "It is man's natural food, because in it are contained all the elements necessary for the formation of the body; phosphate of lime for the formation of bone; salts of soda to aid in the gastric juice and to give fluidity to the blood; casein to form the flesh; and butter to produce fat."

"Milk contains, besides water, of organic substances destitute of nitrogen, sugar and butter of an organic substance; holding nitrogen in considerable quantity, curd or casein; and of inorganic or saline matter partly soluble and partly insoluble in water. It thus derives its richness from butter; its sweetness from sugar; its thickness from casein; its refreshing property as a drink from water; and its peculiar flavor from the salts it contains."

Milk boils and freezes at about the same temperature as water, when boiled at 212° F. it yields a thin pellicle, consisting of a combination of casein with the inorganic salts. It may be prevented from becoming sour by being kept at a low temperature; at a high temperature it will sour rapidly, and at boiling point will curdle immediately. The acid contained in milk is termed lactic acid. The specific gravity of cow's milk is 1·034. It varies with the breed, food, age and health of the animal. Good milk is neither too thick nor too thin, its consistency should be such that a drop should preserve its roundness without running. In color it should be of a beautiful white with a bluish or yellowish tint, only slightly transparent

and odourless, with an agreeable sweetish taste. The cream or fatty part of milk floats to the surface in a few hours. To obtain cream, the milk should be kept in broad flat dishes about one inch in depth as the cream does not rise through a great depth of milk. The formation of cream is retarded by a low temperature and accelerated with an increase of temperature.

Lactometers or milk-testers are in use to ascertain the purity of milk, and will be found useful instruments to those who are obliged to purchase their milk, as well as to those who are obliged to rely on their cowmen entirely for the purity of their milk. These instruments are now made expressly for a temperature of 80° F. by Messrs. Orr & Sons, Madras, and it only approximately indicates the quality of milk. A correct and accurate gauge for milk has not yet been produced as in the case of Hydrometers for spirits. The instruction given is :—" Fill the glass jar with the milk to be tried and allow it to cool, then immerse the lactometer and notice the mark on the scale that is level with the surface of the milk which will show the quality.

The mark M	being	pure milk.
3	,,	three parts milk and one part water.
2	,,	half milk and half water.
1	,,	one part milk and three parts water.
W	,,	pure water."

THE COMPOSITION OF MILK.

Milk is the secretion of the mamary glands of animals belonging to the order mamalia, opaque and generally white in color, it has a sweetish taste, and but faint smell. Its chemical reaction seems to be generally slightly alkaline, though chemists have frequently found specimens to be acid. Human milk has been found in a few cases to be neutral; in all others alkaline. When the milk of herbivorous animals has been found to be acid, as is sometimes the case, the result

is believed to be due to extraneous causes, (the nature of the food, &c.), while in contradistinction, the milk of carnivorous animals, such as dogs and cats, is always acid. Milk is somewhat denser than water. Its specific gravity differs according to the source from which it is derived; thus human milk has a specific gravity of about 1·030; cow's milk 1·029—1·034; goat's milk 1·02, water being taken as 1. Both human and ass's milk is sweeter than cow's milk, while goat's milk possesses a peculiar odour and somewhat insipid taste, and generally is richer in fat and casein than cow's milk. When deprived of its cream, milk assumes a bluish color. Microscopically considered, milk is a clear liquid, having an immense quantity of round or oval globules known as milk globules! floating in it. These are particles of fat encased in an external envelope of casein. The liquid in which these globules float is a solution in water of casein, albumen, milk, sugar, and mineral matters.

Popularly speaking, we divide milk into cream and skim milk, as on standing it separates itself into these two portions; when kept still longer, we are aware of its turning sour, and forming a curd, the clear liquid left when the curd is removed being called whey. The cream contains the fat globules, which on account of their lightness, rise to the surface. These fat globules, together with water, constitute about 95 per cent. of the cream, the remainder being small quantities of casein, with sugar and mineral matters. From the cream butter is manufactured by the process of churning. The curdling produced in milk when it turns sour after keeping a few days is due to the separation of the curd or casein in consequence of the formation of lactic acid from the milk sugar. The same effect of curdling may be produced by the action of an acid added in excess to either new or skimmed milk, or by the action upon it of rennet, a watery extract prepared from the fourth stomach of a calf. It

is on this principle that cheese is manufactured. We must now, having briefly explained the general appearance presented by milk in its different stages of keeping, consider somewhat more closely its chemical composition and nature.

Milk contains fat, casein, albumen, milk sugar, and salts of milk, forming the chemical constituents which enter into its composition—their several properties, the changes which they undergo, and the part they take individually in forming the sub-divisions of milk, viz., cream, curd, whey, &c.

BUTTER-MAKING.

The milk is generally boiled and to it is added a teaspoonful of sour milk, (butter-milk) the quantity being regulated according to the season, and is kept aside for 24 hours to form curd (tyre) when a quantity of water is added and churned. Unboiled milk (fresh) may be treated in like manner, but the boiled is believed to yield the largest quantity of butter.

The apparatus consists of a stake some 4 feet in height, being driven into the ground, with two bridges of palmyra stalks or bamboo laths tied, and arched in front, at about 2 feet apart. At the foot of the stake an earthen chatty with curd is placed with an addition of water; the churn comprises a piece of smooth bamboo 5 feet long, one end of which is quartered into four and opened out to a width of 3 or 4 inches with small pieces of bamboo placed crosswise to keep it open; this end is placed in the chatty and drilled with a piece of string from its centre between the arches on the stake, and in from 10 to 20 minutes the butter is formed and found floating in the chatty, when it is collected. This is the universal Indian mode of churning butter, and the results are satisfactory.

HOUSE-CHURNING

Consists in collecting the cream of the milk, after a rest of 24 hours in shallow dishes, into a large basin

or bowl and worked with a piece of wood having a large knob at one end, termed a "muthoo," for 25 or 30 minutes, until the butter rises to the surface. When cold water is poured on, to rinse out the milk from the butter, and it is then shaped as required for use.

BOTTLE-CHURNING.

Fresh milk or cream is poured into bottles three-quarters full and freely shaken for 20 to 25 minutes when the butter as it rises to the surface is collected for use.

CHURNS.

These are of recent introduction in this country. There is the "Brighton," the "Barrel" and "Atmospheric," &c., churns; of these the last or atmospheric churn is about the best, and is well adapted for the requirements of India.

A quart of milk will yield from 1 to 2 ounces of butter.

BUTTER.

Butter is a fatty oily substance held in suspension in milk, and it rises to the surface by its lesser density; it brings up with it serum and casein; the whole form cream.

The qualities of good butter are a mild, agreeable, and slightly aromatic taste and a yellow color shading into orange.

"Run" butter is butter melted, clarified and potted for use. In India "ghee" is the name given to this preparation.

Good butter is closely connected with good milk, and the latter in turn with the feed, and the breed of cattle. Sour cream yields more butter of an inferior quality.

GHEE

Known as Run or Clarified Butter, is largely manufactured in India. It is made by melting the butter in a warm saucepan placed on the fire till it boils, and all the sediment it may contain either sinks to the bottom or floats at the top leaving the ghee clear

beneath, and as an invariable rule where procurable a few drumstick leaves (*Moringa pterygosperma*) are thrown in, care being taken not to over-boil the ghee; it is taken off the fire and strained whilst warm through a piece of cloth and then bottled for use. Ghee is in general and daily use among the natives and enters largely in the preparation of their confections, sweets, &c., curries. It is manufactured in most towns and villages in large or small quantities, either for sale or for their own use. When made in large quantities they are filled into what are called dubbers—large oval bottles with small mouths made of goat skins—when they are ready for transport to the market. About three pounds of butter will produce a bottle of ghee.

GARGET

Is an inflammation of the udder caused by a sudden over-distention of the part from a rush of new milk tending to the formation of milk abscesses in the udder. The part feels hard and tender to the touch and there is more or less constitutional irritation present. This disease shows itself most frequently in young animals with their first calf. The calf should be put to the mother and the milk should be gently stripped away so as to empty the udder, the part should be bathed in water and have warm fomentations applied freely two or three times a day, followed with gentle friction, with some camphor oil, and the patient should have a pound of epsom salts in gruel given her twice a week according to the effect produced. Abscesses should be looked for, and at the first indication they should be opened and the matter let out and the opening treated as a wound—care being taken to keep flies off by the free use of carbolic acid oil to the part.

In some cases although no abscess may form, still painful chronic indurations may remain, these should be gently rubbed daily with some Iodine ointment so as to disperse them after a while.

SORE TEATS.

The udder and teats of the cow are very much subject to inflammation, more especially immediately after calving, owing to the increased activity which takes place in the formation or secretion of milk producing tenderness and irritation in these parts. Sometimes the teats are simply excoriated and very tender to the touch, and the cow suffers much pain and becomes very restless during the process of milking and frequently becomes unmanageable.

The milkman may not be aware of the fact, but fancying the cow is simply showing temper will ill-treat her and thus induce her to withhold her milk. When a cow becomes restless on the teats being handled, they should be carefully handled to discover abrasions or ulcers in them, and should any be discovered, they should be bathed in warm water frequently and be fomented and have some simple ointment applied to the part night and morning for a few days which will remove the disease; or the parts might first be bathed in some warm alum lotion and then have the ointment applied. The cow will also be the better for a dose of medicine.

COW-POX.

This is an eruptive fever that attacks animals but once in the course of their lives and the eruptions show themselves about the centre and base of the teats and sometimes on the udder itself in the form of circular pustules, which, when fully formed, attain the size of a silver four-anna piece.

To this noble animal mankind are indebted for the invaluable blessing conferred on them by the immortal Jenner by Vaccination. The disease may show itself and go through its course followed by some constitutional disturbance without detection, except in the instance of milch cows; owing to the situation of the pustules, and the pain and irritation set up by the

process of milking, the cow becomes restless and violent, from which the disease may be detected. In all such instances the fact should at once be communicated to the nearest medical officer as the occurrence of natural cow-pox is of great interest to the medical profession and of value to man, as the lymph can be transferred to human beings by inoculation with great advantage. The cow-pox pustules are of a circular form having a central depression with raised margins distended with a clear fluid termed lymph, which gradually becomes opaque and purulent and is surrounded by a red blush of inflammation which medical men term the areola when it occurs in the human subject. In the course of a few days the pustules burst and form scabs, these drop away in a fortnight or three weeks leaving a circular cicatrix slightly pitted. The disease terminates in about three weeks and calls for no special treatment, except in the instance of milch cows, where the operation of milking is likely to interfere with the disease in breaking the pustules and irritating them to such a degree as to convert them into open ulcers. Care should be taken to avoid injuring the pustules and no particular treatment will be required, unless there is an indication of loss of appetite and the cessation of chewing the cud, when it may become necessary to give the animal rest and an aperient or two.

CALVES.

The calf requires no assistance; **in** from 20 to 30 minutes it is on its legs if strong and healthy, and instinctively begins to seek for the udder. It gets at the teats, sucks away till satisfied, and then lies down alongside of its dam, whose attention it continues to receive. Calves, as a rule, are never weaned in India, they are generally allowed to suck their dams and are tied apart except when milking and for an hour or two after, when they are allowed to run loose, care should

be taken to see that they get a sufficiency of milk, and should the supply fall short they should have some rice-conjee given them ; the conjee-water strained after the boiling of rice makes a good drink for young calves in addition to the supply of milk that they get. They should also receive a supply of grass, oil-cake or other food, to enable them to grow strong and become good serviceable animals.

THE NAVEL ILL.

Occasionally calves suffer from this disease; owing to the abrupt or imperfect separation of the navel cord, the navel bleeds. Should the cord be of sufficient length a ligature might be passed around the end and tied, but if close to the abdomen, a little burnt alum with a pledget of lint tied on to the part would suffice, but should the bleeding be profuse, a small iron nail should be heated to a black heat and the part touched with its thick end lightly, so as to seal up the open mouths of the vessels.

They seldom give trouble if attended to at once; sometimes an abscess may form in the part and even lead to inflammation of the peritoneum and bowels, thereby occasioning the death of the calf should it not be attended to carefully.

COSTIVENESS.

The best medicine for the calf is the cow's first milk; very seldom indeed is any other required, and when there is a necessity for an aperient being given, 2 or 3 ounces of castor-oil with a drachm of ginger powder may be administered with half a pint of rice-conjee.

SCOURING or DIARRHŒA.

Calves are frequently subject to scouring caused by indigestion brought on by repletion. At other times the disease may be caused by the free eating of the young tender grass. On the other hand starvation or

the want of sufficient nourishment may produce the disease. Danger may be apprehended should the calf begin to refuse its food and grow dull, and the diarrhœa continue. The first thing to be done is to administer a mild aperient so as to clear out from the bowels any indigestible substance the calf may have eaten and nothing is better than castor-oil for this purpose, 2 to 4 ounces of castor-oil in a pint of rice-gruel, and as soon as the medicine begins to act, astringents should be given and green food withheld. The best astringent to give in such cases is the chalk mixture prepared as follows :—

Prepared chalk, one ounce; tincture of catechu, two ounces; laudanum, one ounce; mucilage of gum acacia, three ounces. One to two ounces of this mixture should be given 3 or 4 times a day, and the patient should have a couple of pints of gruel besides its milk. The calf should also have a teaspoonful of common salt administered every morning for a week or ten days; as the diarrhœa becomes less, the chalk mixture should be given at greater intervals—once or twice a day according to circumstances. The patient should be kept warm and made comfortable in its crib.

FOOD OF MILCH COWS.

The chief food given to cows when in milk in this country consists of cotton seeds, oil-cake, potoo, or the shell of the pigeon pea and rice bran, besides green grass and straw.

The drink comprises washings of raw rice and the strained conjee from boiled rice in a state more or less of fermentation.

Cotton seeds.—These are either given wholly steeped in water or are pounded in a mortar so as to break them up when they are moistened with water to soften the shell and given to cows either alone or mixed up with the substances named above. The quantity given to a single cow night and morning averages from 3 to

5 pounds according to the size of the animal; when given with either oil-cake, potoo, or rice bran, the quantity is reduced to 2 or 3 pounds at each occasion.

According to the analysis given by Dr. Royle, oil-cake from cotton seeds contains water, oil, sugar and albuminous compounds, whilst the ash contains silica and phosphates with excess of phosphoric acid from which it will be seen that the oil-cake from cotton seeds possesses considerable nourishing properties, and this is increased tenfold when the seeds themselves are used without the extraction of the oil they contain. The testa or shell covering being hard and leathery when dry, the seeds should be steeped in water sufficiently long to soften or they should be pounded and moistened with water and allowed to stand for an hour or two ere given to the cow.

Oil-cake.—There are three kinds of oil-cake available for feeding cows, that from the gingeelie seeds or yelloo (*Sesamum Indicum*), the groundnut or vayr-cuddalay (*Arachis hypogea*), and the cocoanut (*Cocos, nucifera*) poonacs as they are called. The first is more generally procurable but a little more expensive, the second is the cheapest and perhaps the best when procurable. Sometimes that from the cocoanut may be available. All these oil-cakes form good nourishing food not only for cows but cattle generally and are invaluable for the formation of the various tissues that enter into the formation of the animal structure to enrich the blood and promote the secretion of milk; but practically the poonac is reputed to be a good milk-producing food, although the natives think that whilst it increases the quantity it deteriorates quality by rendering the milk weak and watery. This does not tally with my own experience.

Potoo is the shell or testa of the pigeon pea or *Tour dall* (*Cajanus Indicus*) which abounds in phosphates and other flesh-forming elements, and although the testa on account of its leathery dry hard nature is rejected by

man it is valuable to cattle and is largely used for feeding milch cows owing to its cheapness; from 2 to 5 measures may be given daily and when mixed it might well be reduced to one-half this quantity. It should be steeped in water to soften for a few hours ere given to the animals.

Rice bran, commonly known as tour, is largely used to feed not only cattle but also poultry, for it is believed to be nourishing food. It is the brown pelicle that covers the grain and lies between the husk and the grain of rice or paddy; like wheaten bran it abounds in phosphates and other flesh-forming materials. It is mixed with water to form a mash and given to cattle, or it may be usefully and with advantage mixed with cotton seeds, oil-cake and potoo and given to cows. From 2 to 3 measures twice a day formed into a mash is about the quantity given. Grain of any description is never given to milch cows as it is believed by the natives to be heating and to arrest the secretion of milk.

The universal and favorite drink given to cows is the rice-washings and the conjee strained from boiled rice. The water is collected and kept for two or three days and generally given to the cow as a drink of a morning after it has had its usual food. It is in a state of fermentation and the cows are very partial to this drink, they also receive water when the rice-washing is not available and even with it. Green food, a bundle of green grass given every night to those cows not let out to pasture is good, as they enjoy the grass much; each cow should receive from 25 to 30 pounds of green grass and 20 to 30 pounds of paddy straw during the day, but those animals that pasture out in the day may have the straw at night instead of the grass. Cows in milk are the better for a spoonful of salt with their food twice a day. Cows should be groomed and cleaned daily and great attention given to the cleanliness of the stable or cow-house in which they are picketted for the night. It should be also

seen that ample breathing space is provided for each animal to keep them in health.

In the Punjab the dried and bruised leaves of the wild bhere, *Ziphus jujuba* (Yellandum marum, Tamil) is given to milch cattle to increase the quantity of ghee; green wheat, and mustard and maize, green with the ears on, and "joar" or cholum are said to increase the quantity of milk. Cows that have lately calved and whose milk is deficient, get milk mixed with goor (*molasses*) and also wheat and barley made by boiling into a kind of candle called kunji.

General Morgan's condimental food for cattle :—

	RS.	AS.	CWT.	QRS.	LBS.
Oil-cake, such as cocoanut, gingelly or grounduut ...	21	0	7	0	0
Carob beans	40	0	8	0	0
Indian corn, cholum, raggy or gram	10	0	4	1	0
Powdered turmeric	6	0	0	1	0
Ginger	1	0	0	0	3
Fennygreek seed or vendium gentian	2	0	0	0	10
Cream of tartar	1	0	0	0	10
Sulphur	5	0	0	0	10
Common salt	1	8	0	0	20
Coriander	0	14	0	0	7
Rs...	88	6	One Ton		

This condimental food costs Rs. 4-8-0 a cwt., and in wet weather would be found excellent food for cattle. When the grasses are young also and full of sap (after the rains) cattle are apt to purge from there being no salts in the grasses, at such times condimental food is essential to keep the animals in health; 3 or 4lbs. daily have a great result, even at other seasons when the animals become weak and debilitated from disease or

the want of good nourishing and suffer from loss of appetite, the condimental food would be found most useful in stimulating and nourishing the animals and giving tone to the system generally.

In the Coimbatore District good working cattle receive the following scale of fodder each :—

Straw, 30lbs.; horse-gram, $1\frac{1}{4}$ measures or $2\frac{1}{2}$lbs. raw, which if boiled produces 5lbs.; 50lbs. Guinea or other grass; 1lb. oil-cake and 6lbs. of cholum, raggy, or cumboo straw, and on which they keep excellent condition.

DISEASES.

ANTHRAX FEVER.

This is a contagious disease communicable to both man and beast, to the former as a malignant pustule and to the latter as an inflammatory tumour or gangrenous boil that may show itself on any part of the animal's carcase, and is attended with high fever.

The tumour may vary in size from that of a hen's egg to that of cocoanut, and be well defined or diffused as a tense swelling—the surrounding tissue becoming infiltrated with unhealthy lymph; it is very tender to the touch and crackles under the pressure of the finger, showing that the part is inflated with air generated by the decomposition of the vitiated secretions. This disease is always an indication of impure blood and is attended with a fatal prostration of the strength. In this country the disease generally shows itself during the hot months when pasture and fodder become scarce and the water-sources impure. Sometimes rich luxuriant food after previous starvation and impoverishment of the blood, produces the disease.

It prevails as an epidemic in malarious localities and may show itself suddenly.

Symptoms.—The pulse is at first full and excited, subsequently, it becomes weak and rapid, the breathing hurried and the animal moans. The swelling increases rapidly terminating in the death of the animal, from a few hours after the attack to as many days, dependent on the previous state of health and strength of the animal.

Treatment is of little or no avail when the disease has fully set in, but should the animal be seen when

in a stage of excitement and before any defined swelling has made its appearance, half a pound of common salt should be dissolved in some rice-gruel and be administered immediately, followed up every six or eight hours with half-pound doses of salt with gruel till some effect on the bowels is produced, and should the animal give indications of prostration, 6 to 8 ounces of country arrack with a quart of gruel should be administered every 6 hours.

The animal should be strictly isolated and placed in an open well-ventilated shed, and its drink should consist of pure water with an ounce of nitre dissolved in every gallon. The food should consist of rice-gruel, and some fresh tender grass, when procurable.

Post-mortem.—Chest—The lungs are gorged with a bloody serum, and from 2 to 4 pounds of the bloody serous fluid is found in the cavity of the chest. Heart—Left side empty, right distended with jelly-like clots of blood.

The abdomen contains about the same quantity of bloody serum. The liver and spleen are large, dark-colored and friable. The intestines are generally empty and the bladder also, but it may sometimes contain a few ounces of bloody urine.

Precautions should be taken to isolate a diseased animal and to prevent any communication taking place between it and healthy ones by means of attendants, &c., &c.

APOPLEXY.

By this term is meant a sudden insensibility with loss of sensation and motion occasioned generally by an unexpected rush of blood to the head, followed by effusion of blood on the brain producing pressure and terminating in some lesion of the blood vessels.

Symptoms.—The premonitory symptoms are seldom observed and attention is drawn to the animal only

when it is struck down; but a careful observer will have noticed general listlessness and indisposition to motion, breathing slow and somewhat labored, with slight fulness and protrusion of the eye-balls. But when the animal is struck down, the breathing becomes stertorous, slow and labored, the pulse full and slow, a frothy mucus issues from the mouth, the skin becomes cold, eyes glassy, bowels torpid, and it struggles in a fit more or less violently for a time; death may follow in from 1 to 24 hours.

Treatment.—Pour cold water from a height on the head for some time and should the animal appear able to swallow, give a pound of epsom salts, or common salt, dissolved in a couple of quarts of warm water. The salts should be repeated in smaller doses every three hours till some effect is produced on the bowels, and should an enema syringe be at hand, inject from 2 to 4 gallons of tepid water into the bowels. If the animal becomes conscious, it should be kept quiet, some weak rice-gruel given as drink, and free action of the bowels promoted.

BRONCHITIS.

Inflammation of the bronchial tubes may be acute or chronic. The acute form is a serious disease on account of the rapidity with which the inflammation spreads to the substance of the lungs.

Symptoms.—Shivering followed by high fever, difficult and hurried breathing, cough which is dry and harsh at first and afterwards becomes husky and wheezing, with a mucus discharge from the mouth and nostrils; a haggard careworn look about the animal with disinclination to motion and inability to chew the cud. The neck stretched out, frequently with the muzzle resting on the ground to ease breathing. Bowels torpid with rapid emaciation, loss of flesh and strength, and loathing of food; but when the disease comes on gradually it generally succeeds a neglected catarrh and is followed by all the acute symptoms.

Causes.—The disease is caused chiefly by exposure to wet and cold as well as by sudden changes of temperature, over-exertion, &c., &c.

Treatment.—As soon as the patient comes under treatment, the bowels should be acted on by a pound of common salt dissolved in two quarts of warm water, and half a pound of salt, repeated every four hours with a quart of rice-gruel, till they work freely.

Two ounces of nitre dissolved in a gallon of water should be given as a drink as often as the animal may be inclined to partake of it. Counter irritants should be applied to the chest; the most rapid in acute cases being scalding with a hot blanket or firing with hot iron. When the case is not urgent, fly-blister dissolved in turpentine or acetic acid may be well rubbed into the sides and chest, or a liniment formed of equal parts of turpentine and mustard oil may be applied.

Diet to consist of rice, cumboo or raggy-gruel and a little tender green grass. The animal should be kept warm, covered with a stout cumbly jhool, and confined to the byre or cow-shed.

CATARRH

Is an inflammation of the mucus membrane of some part of the air passages. It is a common disease arising from cold or sudden change of temperature, and generally when left alone runs its course in 3 or 4 days.

Symptoms.—General feverishness with a mucus discharge from the nose; the eyes may become watery in aggravated cases. Cough may be present. It is a trifling ailment in itself, but often precedes more serious diseases of the air-passages.

Treatment.—Rest and an aperient of which 8 to 10 ounces of common salt dissolved in tepid water given as a drench is the best. All drinks withheld for 24 hours will often cure a common catarrh.

CALCULI

Or concretions of various kinds are frequently found in the rumen of cattle. These are generally round and polished, varying in size from that of a hen's egg to that of an orange and of a dark-greenish color; sometimes there is a small round hole on one side from which a few hairs may be found protruding, a careful examination proves it to consist chiefly of mucus with some trace of bile and a mass of hair matted together, occasionally a piece of straw, wood, or chalk forms the nucleus. As far as I am aware, although one or more of these calculi may be found in an animal they do not appear to interfere with its health. The natives of India call it the hair diamond (mire manickum) to the possession of which they attach some value, as it enters into some of their nostrums and is often sold for the purpose. It is said to be found only in very fiery or spirited animals. It is occasioned from the habit that cattle have of licking each other and of cows licking their calves; the hair removed by their rough tongues is swallowed with the saliva, accumulates, becomes matted and forms these balls or concretions. As there is no way of ascertaining their existence, and as they do not interfere with health, no treatment of any kind is necessary.

CHOKING.

Cattle sometimes choke while eating greedily, especially from oil-cake not being properly crushed or from stalks of cholum, cumboo or raggy.

Symptoms.—General uneasiness, restlessness and loss of rumination. The animal coughs and salivates, and from being unable to swallow water returns it through the nostrils. Constant efforts to swallow or cough up the obstructing material are made, and if it is not removed, distension of the stomach follows, the enlargement showing itself chiefly on the left side. On examining the throat with the hand, the part at which

the obstruction rests can be readily made out; gentle pressure and friction may often give relief at once.

Treatment.—Attempts should, in the first instance, be made by introducing a small hand into the mouth to see if the obstacle can be reached by the fingers, failing which, two or more ounces of castor-oil may be poured down the gullet in the hope that it will lubricate the passage and thus facilitate the descent of the obstacle, or some warm gruel may be tried and the animal in attempting to swallow the liquid may force the obstacle down. Should these prove unsuccessful the probang ought to be used, and in the absence of one, a rattan cane 5 feet long and about half an inch in diameter being covered at one end with some soft cloth or wash leather may be substituted, care being taken that the cloth or leather is securely tied to the cane so as to prevent its getting loose. - Previously however, the mouth must be opened by the introduction across it of a piece of wood with a hole in the centre to allow of the cane being passed through, and to prevent its being injured by the teeth. The animal being securely held down the cane should be well oiled and carefully introduced till the obstacle is felt when it should be pressed firmly downwards till relief is afforded. If the object should not thus be obtained, a Veterinary Surgeon will have to be called in, as a cutting operation may be necessary.

COLIC

Is characterised by pain and distension of the abdomen occurring in paroxysms which may be the result of flatulence caused by imperfect digestion and fermentation of the indigestible portion of the food or by undigested food irritating the mucous surfaces and producing spasms.

Symptoms.—General uneasiness and restlessness, striking the stomach with the horns or the hind feet, frequent getting up and lying down; pulse excited.

Unnatural coldness or warmth of skin will at once indicate that the animal is in pain.

Treatment.—On examination should flatulence exist, 6 to 8 ounces of country arrack with half an ounce of powdered ginger should be given at once. If not better in 3 to 4 hours, a pint of castor-oil with an ounce of laudanum according to the size of the animal should be given to allay pain and spasms, and to free the bowels from any irritating undigested food that they may contain. This should be assisted with gentle hand-rubbing of the abdomen, and exercise will tend to expel the gas and thus relieve the animal. Large quantities of warm water should be thrown up the bowels with a clyster pipe, while friction with turpentine or mustard-oil to the abdomen is being resorted to. The secret consists in getting the bowels to act freely so as to rid the intestines of all irritating matter.

CONSTIPATION

Is often caused by the dry food cattle have to subsist on in this country for the greater part of the year, and sometimes it is difficult to treat such cases successfully owing to the peculiar construction of the stomach of horned cattle; but should the first full dose of an aperient, be it salts or castor-oil, not have the desired effect, it should be repeated at intervals of from 4 to 6 hours in smaller doses till some effect is produced, and the animal should be restricted to a watery diet, such as bran or rice-gruel, till the natural action of the bowels is obtained. Large quantities of tepid water thrown up the bowels will accelerate the effect of the medicine.

CATTLE POISONING.

Cattle are sometimes accidentally poisoned by eating deleterious substances, such as the datura, oliander, &c., and even tobacco frequently proves fatal; but

animals instinctively avoid all such substances. Sometimes chucklers and other low caste natives resort to arsenic, with a view to secure the hide on the death of the animal, but these cases seldom come under treatment.

Symptoms.—The animal whilst well and feeding is seized with a peculiar trembling fit, particularly when arsenic is used as a poison. Grows restless, constantly falls and rises, strikes its stomach with its horns and feet and turns its head towards it, foams at the mouth, has general muscular twitchings with flatulence and frequent inclination to dung or urine. When diarrhœa sets in, the stools are bloody, and according to the degree of the poison, death takes place in from 3 to 8 hours.

Treatment.—Little or nothing can be done, pint-doses of castor-oil and plenty of rice-gruel should be freely given.

DIARRHŒA

Is a common disease among cattle, resulting in most cases from unwholesome food. It is often caused by partaking too freely of the fresh shoots of grass which spring up so luxuriantly after rain, but more frequently it shows itself during the hot weather when pasturage and water becomes scarce; occasionally it is the premonitory symptom of a more serious disorder being the effort of nature to get rid of some irritating substance. Sudden change of food from dry to green or of seasons from hot to cold and *vice versâ* may frequently cause the disease. Impure water sometimes produces it.

Symptoms.—The term diarrhœa may be limited simply to purging in which the motions are loose or liquid, copious and feculent. Cramps, flatulence and abdominal pains may be present at the same time.

Treatment.—In most cases of diarrhœa it would be well to clear the bowels by a dose of castor-oil with which view 8 to 10 ounces with half an ounce of

laudanum should be given, and as soon as the medicine has operated 4 to 6 ounces of astringents such as the following chalk mixture should be shaken and administered every six hours :—

Prepared chalk..................	2 ounces.
Catechu..........................	1 ounce.
Ginger	½ do.
Laudanum......................	2 ounces.
Water	1 quart.

Or the following draught may be given :—

Extract of Taraxacum	3 ounces.
Epsom salts	½ ounce.
Carbonate of Iron.............	¼ do.
Hot water........................	a pint.

It would be better to substitute castor-oil in some cases instead of the epsom salts. "The condimental food" in such cases would be of great advantage if given for a few days.

Great attention should be paid to water and food, the former of which should be pure and the latter easily digestible, such as rice or other grain, gruel and bran-mashes; fresh tender grass may also be given when procurable.

The drink should consist of conjee-water or watery-gruel to which a spoonful of chalk may be added. The animal should be placed in a well-ventilated shed and be carefully attended to.

DYSENTERY.

This disease, popularly known as the "bloody flux," consists chiefly in inflammation of the mucus membrane of the large intestines. It may be the sequel of diarrhœa, murrain or some other serious disease. When it occurs idiopathically in this country it is attributable to unwholesome pasturage or fodder and impure water.

Symptoms.—The attack comes on suddenly, though the animal may have been dull and listless for some-

time previously; a shivering fit followed by high fever supervenes, the pulse is excited and stools frequent. At first the dung comes away in little pellets mixed with serum blood or slime attended with much pain and straining, the back is arched, the tail raised and frequent attempts are made to dung. Sometimes the effort to strain is so great that a portion of the bowel protrudes. The patient looks haggard and exhausted, the mucus membrane of the eyes, nostrils and mouth is pale and tinged with yellow, the breathing is accelerated, the pulse, at first full and excited, becomes weak and tremulous, the animal moans and grinds its teeth frequently; the skin is harsh and dry and the coat staring and ragged; there is loss of appetite with great wasting, the evacuations become bloody and fetid and are sometimes shot out to a distance. The patient eventually dies of exhaustion.

Post-mortem Appearances.—The liver is sometimes engorged, at others shrunken, of a dark color and very friable. There is some congestion and thickening of the mucus membrane of the fourth stomach and small intestines; the large intestines appear stripped of their mucus membrane and are scattered over with small ulcerations.

Treatment.—The bowels should be cleared out at once with 8 ounces of castor-oil mixed with an ounce of laudanum, which should be repeated every day or on alternate days as circumstances require. Should the abdomen appear tender on pressure, scald with a hot blanket; but if there is no tenderness, rub it and the flanks well with equal parts of turpentine and mustard-oil. An ounce of laudanum and one ounce of the tincture of catechu with a pint of gruel should be administered every 6 hours till the stools become less frequent and their character is improved. Till the patient improves the diet should consist of rice-gruel to which a pint of country arrack, 2 ounces of catechu and one of all-spice, should be added and given twice

a day. The patient should be placed in a clean well-ventilated apartment and covered with a stout cumbly.

DROPSY

Is an accumulation of fluid in the loose tissue below the skin or in any of the larger or smaller cavities of the body. It is generally a symptom of disease of the heart, liver, spleen or kidney. The swollen part pits on pressure, and when the effusion takes place in a cavity, it causes inconvenience and distress from the pressure excited by the fluid on neighbouring organs. Fluid gathering in the chest, pericardium or heart bag causes death, sometimes speedily at others tardily.

Symptoms.—The animal slowly increases in size, the abdomen enlarges, the swelling is uniform throughout, and as the belly fills and drops, the flanks appear hollow, and percussion will elicit a dull drum-like sound and fluctuation of the accumulated fluid can be felt by the hand. When general dropsy is present the skin pits on pressure, the animal grows dull, is disinclined to motion, the skin gets dry and the coat rough, and there is excessive thirst. There may be constipation or diarrhœa, the membranes of the nose and mouth are pale and the conjunctiva yellow. The respiration becomes difficult, and eventually the animal dies of suffocation or general debility.

Treatment.—Purgatives should be given, of which the best is epsom salts. One pound of the salts dissolved in a quart of tepid water should be given daily or every other day and regulated according to the effect produced. Two ounces of nitre dissolved in a gallon of water should be placed before the animal and it should be allowed to take as much as it cares to drink. Friction or good hand-rubbing should be applied 2 or 3 times a day for an hour each time. Should there be indications of debility, a pint of country arrack in a couple of quarts of rice-gruel should be given twice a day. Diet should consist of rice-

gruel, bran-mashes, &c. The animal should be kept in a warm room and covered with heavy jhools so as to promote the action of the skin. Should great accumulation of fluid take place, the most dependant part of the belly should be punctured with a trocar and the fluid allowed to escape slowly. Large quantities of fluid may be withdrawn by this method, but the strength of the animal should be well supported with tonics and stimulants of which the best is

Camphor......................	half an ounce.
Nitre..........................	one ounce.
Arrack.........................	six ounces.

given as a drink 3 times a day with a quart of rice-gruel.

DISTENSION OF THE RUMEN.

Cattle sometimes gorge themselves when put to succulent grass or other palatable food to such an extent that the rumen or large stomach gets impacted, and the coats become paralysed from over-distension and cease to perform their functions.

Symptoms.—The animal at first becomes dull and does not ruminate; the abdomen increases in size, protruding more particularly to the left, percussion elicits a dull heavy sound and on pressure there is a soft, sodden feeling and the part pits or leaves the impression of the finger-marks on the part for sometime after. The pulse becomes excited and the bowels torpid, and if unrelieved, the symptoms increase; difficulty of breathing sets in and to relieve it, the animal stretches out its neck and rests its muzzle either on the ground or the stake to which it may be tethered. There is restlessness, moaning and grinding of the teeth. After a time the undigested food may ferment and aggravate the symptoms. The pulse begins to fail and the animal, if unrelieved, expires from suffocation.

Treatment.—The object is to get the stomach to act quickly, and with this view stimulants with aperients

such as the following should be given: 8 to 12 ounces of epsom salts, two ounces of powdered ginger, one ounce of black pepper and half a pint of arrack with a couple of quarts of warm water. Throw up into the bowels by an enema large quantities of warm water. Equal parts of turpentine and mustard-oil should be gently rubbed on to the stomach with the hand, and should the bowels not act in 6 or 8 hours, half a pint of castor-oil with the same quantity as before of arrack, ginger and pepper should be given every six hours till relief is obtained. Fodder should be withheld and warm or tepid water given freely; as soon as the bowels are acted on relief will follow, but the animal should be kept at rest for a few days and have rice-gruel and bran-mashes only, to enable the weakened stomach to regain its tone; should the prescribed remedies fail and the fermentation set up not kill by suffocation, inflammation of the stomach may set in with heat of skin, increased action of the pulse, restlessness and pain, so that the animal soon expires of exhaustion.

The only other mode of giving relief is to cut down on the most prominent part of the stomach till that organ is reached; the impacted food should be removed by the hand and after some warm gruel has been poured in, the wound should be sewn up. Care being taken not to allow the contents of the stomach to escape into the abdomen.

FEVER

Is a general disturbance of the system without any local affection or it may be the result of the sympathy of the system with inflammation of some particular part, so that the terms idiopathic and symptomatic are in use to distinguish one from the other. It sets in after a stage of langour, weakness and defective appetite, acceleration of the pulse, increased heat, and general debility.

Symptoms.—Shivering followed by unnatural heat, general dullness, dryness of the muzzle, arrest of

rumination, loathing or indifference to food and heaving of the flanks. The roots of the horns are hot, skin dry and harsh, pulse excited and bowels torpid; after two to six hours the animal appears better, looks livelier and begins to feed; these symptoms may continue for a few days and if not removed, the disease may determine to one of the principal organs by setting up local inflammation as is generally the case in animals.

Treatment.—Confine the animal to the stall and give an aperient of 8 to 12 ounces of epsom salts with an ounce of nitre dissolved in a couple of quarts of tepid water; and as soon as the bowels have been acted on, give twice a day for a few days an ounce of common salt and 2 drachms of nitre in a pint of tepid water. Restrict the animal to a limited quantity of fodder or green grass and allow it as much pure water as it will drink. When free of the disease, give 2 or 3 times a day for a few days half an ounce of powdered cheretta and two drachms of black pepper, made up into a ball with jaggery.

FARDEL BOUND.

This disease is caused by the impaction of food in the third stomach in consequence of the secretion of the maniplies being suspended and its contents becoming dry, hard and caked.

Symptoms.—Loss of appetite, disinclination to ruminate, general dullness, hurried breathing, bowels constipated; in some cases there are indications of diarrhœa which may be slight, urine scanty, high colored with more or less of tympanites. If not relieved in the course of 24 hours, inflammation sets in and all the symptoms are aggravated. The animal seems in great pain, grinds its teeth and moans; the muzzle, horns, ears and feet become cold, the pulse fails, and the animal dies exhausted.

Treatment.—Give a brisk aperient of one pound of epsom salt with an ounce of ginger and half an ounce of black pepper dissolved in a quart of watery gruel and follow it up with a pint of ghee every six hours. Should a stomach pump be at hand, throw up 2 or 3 gallons of tepid water into the stomach and bowels and continue the ghee till the bowels are moved.

EPIZOOTIC APHTHÆ or FOOT AND MOUTH DISEASE.

This is a very common specific fever, contagious, generally epizootic accompanied with vesicular eruptions in the mouth, udder and feet; the mouth or feet becomes affected first, sometimes the mouth at others the feet alone are affected; the udder is only occasionally involved; it is a disease common to many of the lower animals and prevails throughout India for the greater part of the year showing itself first in one place and then in another. It originates spontaneously in many localities and is propagated subsequently to others by contagion.

Symptoms.—Coldness and shrinking of the skin followed by heat; excited, full pulse; muzzle, roots of horns and mouth hot and dry, congestion of the mucus membrane of the eyes and nose, loss of appetite and cessation of rumination; there is a flow of saliva and champing of the mouth, vesicles or little blisters show themselves in the nostrils and mouth, which in the course of 24 hours burst, leaving little sores which may soon heal or become ulcers. The eruptions in the feet first show themselves in the cleft of the hoofs and gradually extend around the junction of the hoof. From the soreness of mouth, pain and excitement, the animal refuses to feed and is quite lame and if neglected, the lameness increases, the ulceration extends, the legs swell, and the hoofs are cast off leaving the quick exposed. Should the eruption be confined to the udder, as is sometimes the case, it becomes swollen, the

teats are ulcerated and the animal refuses to yield milk or allow the calf to suck which adds to the mischief by causing inflammation from the udder being distended with milk.

Treatment.—Isolate and house the animal, see that the shed is clean and well ventilated. Rest and a nutritious diet, such as rice or other grain-gruel, bran-mashes and tender grass should be given, and the animal may get well in a few days; but when neglected, all the symptoms become aggravated. The native treatment when the feet are affected is to make the animal stand in mud and water for three or four hours daily, and this is a good plan in the early stage as it arrests inflammation; the coating of mud acts as a bandage preventing exposure of the ulcers to the air, keeping off flies and other irritating matters and allowing the ulcers to heal kindly; but when the sores have increased and the animal is so lame as to be unable to move, they should be washed twice a day and anointed with camphorated or neem-oil to which a small quantity of powdered catechu may be added.

Carbolic, camphor or neem-oil should be applied to the feet, udder and mouth when ulcerations exist to keep off flies, and as a tonic the animal should daily receive 2 ounces of common salt with a quart of gruel. The type of this epizootic varies, sometimes it may be slight and at others severe, and the treatment must be regulated accordingly; but with a little care the worst case can be cured in a fortnight or three weeks.

HYDROPHOBIA.

This is a terrible malady occasionally met with in India among cattle. It is a convulsive disease chiefly communicated by the saliva of any rabid animal and almost invariably terminates in death.

Symptoms.—At an indefinite time varying from a fortnight to a year, after an animal is bitten by a mad dog or jackal, dullness is first evinced with profuse

salivation, excitement and great thirst, but the animal is unable to drink from spasms of the muscles of the throat. It is quiet at first when approached, but suddenly attacks the intruder and as the fatal issue approaches, convulsions set in and the animal dies of suffocation and exhaustion.

Treatment.—The wound should, if possible, be cut out as soon after infliction as possible and be well and freely washed with cold water; sulphuric or nitric acid should be freely poured in so as to destroy the tissues about the wounded part which should be poulticed and have water dressings afterwards, to remove the sloughs that form, and to heal the wound.

HOVE, TYMPANITIS or BLOWN

Is a common disease among cattle in India occasioned by too free use of succulent food, or by large quantities being eaten without due mastication, whereby the stomach or paunch becomes distended by gas evolved from fermentation of the indigestible matter. When not watched, cattle are apt after the semi-starvation they undergo during the hot season, to rush into cultivated fields and gorge themselves on growing crops, of which cholum (sorghum vulgare) is the most deleterious, and a great mortality ensues. Natives attribute the disease to insects which are said to infest this particular crop; whereas the real cause of the disorder, as has already been stated, is the large quantity of gas generated at the stomach from inability on the part of the animals to digest this rich food.

Symptoms.—A large swelling suddenly makes its appearance on the left side of the belly, which, on being tapped, is quite resonant giving out a clear drum-like sound. The animal is unable to breathe freely, stretches out its neck to obtain ease, grows restless, striking its belly with its horns or feet, grunts or moans, and as the swelling increases seems unable to move; it stands quite firm with outstretched legs,

to give it support and enable it to overcome the difficulty of breathing; and should relief not be afforded, the animal speedily dies of suffocation caused by over-distension of the stomach and pressure on the lungs. This disease may be mistaken for impaction of the omason or distension of the rumen, but the clear hollow sound elicited on percussion, will at once settle the question.

Treatment.—Give as speedily as possible a stimulant composed of one pint of country arrack, four ounces of mustard, one ounce each of ginger and black pepper, made up into a drink with a sufficiency of rice-gruel, repeating the same every four hours; and throw up large quantities of tepid water into the bowels. Should relief not be obtained in 8 or 12 hours and the symptoms become aggravated, no time should be lost in perforating the stomach. In the absence of a trocar, a good sharp penknife may be thrust into the most prominent part of the tumour, between the last rib and haunch bone, into which a tin tube, reed, or bamboo, half an inch in diameter and a foot long, should be introduced to the extent of six or eight inches according to circumstances, through which the gas will rush out and escape freely and the animal will obtain relief immediately; especial care should be taken to prevent the contents of the stomach from entering the abdominal cavity for such an accident will set up an acute attack of Peritonitis; the tube should be retained for two or three hours until the swelling has completely subsided; means should be taken to have the tube tied in so as to prevent its escape from the wound before the proper time for removal. An aperient should now be administered consisting of a pint of castor-oil with an ounce of powdered ginger; and, to rouse the tone of the stomach, an ounce of common salt with half an ounce of black pepper should be given for a few days. When the tube is removed, the wound should be carefully closed by a few stitches.

HAMATURIA or BLOODY URINE

Is a common disease during the hot weather, more especially in those localities in which pasture becomes scarce and scanty and the water-supply impure. It has also been termed " Red and Black water" according to the color of the secretion. It is accompanied with much prostration and debility followed by emaciation. Owing to poverty, the blood, which becomes watery, parts readily with its coloring matter which escapes with the urinary secretion.

Symptoms.—General febrile disturbance with frequent inclination to urinate attended with pain and straining. The secretion scanty and of a reddish color which may, in a later stage of the disease, become dark-red or even black. The animal looks dull (the coat stares, the skin is dry), refuses to feed and does not chew its cud freely, and the flanks become hollow. Diarrhœa may exist at first, but is soon followed by costiveness when the urine becomes viscid and offensive, and the color red or dark-red ; the animal seems in agony when about to micturate, its strength begins to fail, the mucous membrane of the eyes, nose and mouth grows pallid ; the ears, mouth and extremities become cold, pulse weak and tremulous, respiration hurried ; emaciating rapidly the animal gradually expires of exhaustion. The disease may run its course in from two to four weeks.

Treatment.—Give at once a pint of castor-oil and repeat if necessary the next day and till the bowels are freely moved ; then give an ounce of nitre with two drachms of laudanum in a pint of gruel three times a day. Diet should consist of rice-gruel with an ounce of common salt, bran-mashes and fresh grass. When the character of the urine is changed, the following tonic should be given twice a day : cheretta, one ounce ; sulphate of iron, two drachms ; powdered ginger and black pepper, of each half an ounce, made into a ball with jaggery should be given twice a day.

HYDATIDS.

Hydatid tumours occur in the lungs and liver more frequently than in any other organ. They consist of a sack lined by a thin bladder or cyst filled with a limpid colorless fluid, floating in which numerous small cysts, similar to the cyst lining the sack, and varying in size from a pea to a hen's egg, are usually found. In some there are no floating hydatids, or very few; in others, it is literally crammed with them; and these again may contain another generation. The *Acephalocystis Exogena* is the species found in the ox and other domestic animals.

Symptoms.—There may be general feverishness, loss of appetite, suspension of rumination, dry muzzle, hot ears and roots of horns, hurried breathing, and a rough staring coat, indicating the presence of fever, followed by rapid emaciation. Sometimes the animal gives no indication of illness whatever beyond that of loss of flesh and general wasting.

The post-mortem examination will show that either the liver or lungs are perfectly riddled. Cavities as large as a cocoanut may be found in either of these organs.

In India Hydatids are occasioned from the want of proper food, or starvation; the disease generally showing itself during the hot weather, when pasturage and water become scarce. The presence of the disease cannot be ascertained, but may be suspected from the general falling off of the condition of the animal.

Treatment.—When Hydatids are suspected the animal should have a brisk aperient given it of one pound of common salt dissolved in two quarts of tepid water, followed up daily with smaller doses of from two to four ounces of salt, and a good generous diet; and should the lungs or liver not be destroyed by these parasites there may be a chance of curing the animal.

INFLAMMATORY FEVER.

This is almost a fatal disease chiefly affecting the blood and arising frequently without any obvious external cause, but it is followed by some unusual disturbance of the system attended with fever, and pain affecting some of the joints, more especially those of the hind quarter. It may prevail epidemically at certain seasons and is known in England by the names of joint murrain, quarter evil, &c.; some believe the disease contagious, but this is an open question.

Symptoms.—The attack is generally sudden, but it may be preceded by dullness and listlessness. The patient loathes food, but may be thirsty at first and drink greedily; rumination ceases, the ears, horns and muzzle are hot and dry; breathing is hurried with expanded nostrils and open mouth, breath hot, flanks heaving; and constant moaning is observed. The pulse full and excited at first, becomes weak and tremulous; subsequently the animal is disinclined to move; the neck and head are extended, eyes protrude and are congested: the animal may become unconscious or insensible; when induced to move, it staggers and is lame in both hind quarters constantly drooping on either to obtain ease: it tumbles down and makes vain efforts to rise. These symptoms increase in severity and the animal dies of exhaustion in 12, 18 or 24 hours. Some of the joints (large) or the loins swell, and, when pressed, a crackling sound is heard as if air were escaping from under the finger.

Treatment.—Medicine is of little avail as the disease runs its course so rapidly; but when taken early, the diet should be restricted, and a mild aperient, half a pint of castor-oil given at once and repeated in 12 or 18 hours, followed up by the following tonic :—

Common salt................ 1 ounce.
Sulphate of iron. .... 2 drachms.

Ginger and black pepper, half an ounce each made into a ball with a sufficient quantity of jaggery should

be given three times a day. Isolate the animal and place in a clean open shed which should be fumigated twice a day by two to four ounces of sulphur burnt in it; attend to diet and water; and a pint of country arrack two or three times a day may prove useful.

INFLAMMATION OF THE BRAIN

Is generally the result of accidents such as fracture of the horns or blows on the skull. Hydatids in the brain may also give rise to the disease.

Symptoms.—These are dullness and heaviness, eyes staring and congested, respiration hurried, pulse full and slow: after a time delirium sets in and the animal rushes at any object that may come before it galloping about with raised tail and arched neck, tearing up the soil with its horns and fore feet, bellowing, &c., till it tumbles down exhausted.

Treatment.—The best thing to be done is to put a bullet through the beast, as there is great risk in approaching it in this state and difficulty in securing it to administer treatment. If the animal can be secured, a good dose of saline purgative is the best medicine and, therefore, a pound of epsom salts made into a drench should be given at once and repeated subsequently according to circumstances. The diet should be light, and drinks in the form of gruel should be frequently given. The chance of recovery being small it is best to destroy the animal at once.

INFLAMMATION OF THE HEART.

Inflammation may attack the interior lining membrane, that is the substance or the external serous covering of the heart, but, as it rarely occurs as a distinct disease it is no easy matter to diagnose it. The state of the pulse and the action of the heart are the only indications that give a clue to the disease which is caused frequently by cold or mechanical injuries; sometimes it may be the result of kidney disease causing contamination of the blood.

Symptoms.—There is more or less excitement of the system with a small, feeble, intermittent pulse, and violent palpitations and tumultuous action of the heart resulting frequently in effusion of fluid in the pericardium or heart-bag.

Treatment.—The bowels must be cleared out with a mild aperient, say 6 or 8 ounces of castor-oil, which should be followed up by the following, three times a day :—

Camphor	2 drachms.
Nitre	4 do.
Opium	1 drachm

and a sufficiency of jaggery to make into a ball. Equal parts of mustard-oil and turpentine which are the best counter-irritants should be well rubbed into the region of the heart.

INFLAMMATION OF THE BOWELS

Varies much in severity, sometimes being so slight as hardly to attract notice, and at others so severe as to threaten a fatal termination by gangrene or mortification of the bowels.

Symptoms.—The disease is generally preceded by shivering, hot skin, thirst, and hard and frequent pulse; the pain is so acute that the animal tumbles down, turns its eyes about and throws its head from side to side frequently as if in great agony. The horns, ears, mouth and feet become cold, the breathing hurried. And that there is pain in the belly, will be evident from the animal not allowing the region to be touched.

Treatment.—Give at once an ounce of laudanum with six ounces of castor-oil and repeat the same every four hours; administer frequent enemas of tepid water, foment the belly with a hot cumbly, out of which the fluid has been wrung, and cover it with a dry one to retain the heat.

INFLAMMATION OF THE LIVER

May be acute or chronic, but in either case diagnosis is very difficult.

Symptoms.—There may be a perceptible enlargement on the right side with tenderness on pressure, the conjunctiva or lining membrane of the eye may have a slight tinge of yellow; fever may be present with dryness of the nose, quickened pulse, and heat at the root of the horn and mouth.

Treatment.—Give frequent purgatives so as to keep up a laxative action of the bowels for a week or ten days, after which the following should be made into a ball and given thrice a day for a time:—

Camphor ....2 drachms.
Red chillies ....2 do.
Ginger ....1 drachm with jaggery.

PLEURO-PNEUMONIA or INFLAMMATION OF THE LUNGS.

This disease affects both the lining membrane of the chest and the substance of the lungs, one or both lungs may be affected, and it may occur with or without pleurisy when the pneumonia forms the chief disease. The double affection is termed pleuro-pneumonia. It is termed pleurisy when the lining membrane of the chest alone is affected and pneumonia when the substance of the lungs is attacked. Popularly it is termed lung sickness. These distinctions are difficult to ascertain, but they are of no great practical importance. It is a contagious disease peculiar to cattle, frequently assuming an epizootic character and is most insidious in its attack, sometimes its effects are rapid, at others protracted, extending over a period of from one to six months. The first thing to be done when the animal is found to be ill is to isolate it. The symptoms are those of fever and may be preceded by shivering, dullness, drooping of the ears and head with

quick full pulse, ears, mouth and root of the horns hot, lining membrane of the eyes congested, muzzle dry, husky cough, loss of appetite, staring coat, hurried breathing. After a time the pulse becomes rapid and weak, the muzzle is held out to ease breathing, the nostrils are expanded with every act of expiration, and the patient grunts and moans. It stands with its elbows turned out and when it lies down, rests its sternum or breast-bone on the ground so as to aid expansion of the chest. The eyes and nose may be watery, and as the disease progresses, the ears, horns, nose and extremities grow cold, the breath becomes fetid, cough is masked but frequent, the skin becomes hot and tense, and rapid emaciation proceeds. Pressure between the ribs may cause the animal to grunt from pain, purging sets in and eventually the animal dies of suffocation or exhaustion.

Treatment.—Give at once a mild aperient of six ounces of epsom salts and follow it up three times a day with two ounces of common salt, one of nitre and half an ounce of laudanum made into a drench with a quart of rice-gruel; keep the animal well-housed and nursed in a warm well-ventilated shed. Give 10 drops of carbolic acid three times a day in some rice-gruel, or of Calvert's No. 4, fluid carbolic acid one drachm to a pint of water freely mixed three times daily, and freely sprinkle the locality where the cattle are with a solution of carbolic acid (1 to 40 parts) night and morning. Should the animal flinch on pressure between the ribs, scald with a hot cumbly, but if the pain be trifling, try friction with the mustard-oil and turpentine liniment.

This is an almost fatal disease and its progress is never ascertained till it has undermined the animal's constitution. It is best to destroy the animal as recovery in most cases is uncertain and the re-establishment of health doubtful.

INFLAMMATION OF THE KIDNEYS.

This disease occurs more frequently among working cattle in this country and is often the result of violent strains or blows on the loins; it may also show itself idiopathically from sudden changes of temperature, exposure to wet and cold, and from the use of improper remedies in the treatment of other affections.

Symptoms.—There may be more or less disturbance of the general system attended by frequent calls to micturate, the secretion is scanty, high colored, smoky or mixed with blood, attended frequently by pain and straining; the animal flinches when pressed on the back and has an open straddling gait. In some cases symptoms of dropsy may show themselves by a general swelling of the cellular tissue throughout the trunk or by effusion into the cavities of the chest or abdomen.

Treatment.—Give at once eight ounces of castor-oil and repeat, if necessary, till the bowels are well opened, then

Camphor........................	1 drachm.
Nitre............................	2 drachms.
Ginger..........................	2 do.
Opium..........................	1 drachm

made into a ball with a sufficiency of jaggery should be given three times a day. Hot fomentations and turpentine and mustard-oil frictions should also be used. The animal should be kept at rest, and should have large drinks of rice-gruel with two ounces of common salt to every gallon.

JAUNDICE

Is more a symptom of some affection of the liver, than a distinct disease, caused either by some impediment to the flow of the bile or the result of defective secretion of the liver whereby the principles of the bile are not separated from the blood.

Symptoms.—General dullness, the mucous covering of the eyes, nose and mouth tinged with yellow, urine

scanty and of a deep yellow color, bowels costive, in some cases diarrhœa may be present when the evacuations are clay-colored, pulse regular, skin and muzzle dry.

Treatment.—Give at once eight or ten ounces of epsom salts in gruel and repeat, if necessary, till the bowels are well cleared out, after which

Common salt......................	2 ounces.
Red chillies.........	1 ounce.
Ginger.........	½ do.

made into a ball with jaggery night and morning for a week or ten days.

LOSS OF CUD

Is known as the arrest of rumination. It is more a symptom than a disease and is present in most inflammatory affections.

Symptoms.—The animal stands still and does not ruminate ; appears dull, more or less tympanitis may be present, and the action of bladder and bowels are suspended for the time.

Treatment.—Give at once a brisk purgative composed of eight to twelve ounces of epsom salts, one ounce of powdered ginger and one of black pepper made into a drench with tepid water and repeat in smaller doses every six hours; should the bowels not act, have the abdomen rubbed briskly.

PARALYSIS.

By paralysis is meant a total or partial loss of sensibility and motion, or of both, in one or more parts of the animal. It is termed paraphlegia when the hind quarters are affected, and this is the most usual form in which the disease is met with in cattle practice. It may be the result of injuries to the spine from blows, or when in pack bullocks from overloading: sudden changes of temperature and exposure to wet and cold may also occasion the disease.

Symptoms.—An unsteady staggering gait and dragging of the hind quarters, inability to move freely from loss of power, and liability to fall from crossing of the paralysed limbs; and when down in severe cases, the animal is unable to rise. The fæces and urine may be retained altogether or passed involuntarily, pulse full and slow, appetite indifferent.

Treatment.—Give a purgative to clear out the bowels; but should they and the bladder not act, it will be necessary to remove the accumulated fæces by hand and to excite action of the bladder by gentle pressure over it; this will have to be done night and morning. Make

Nux vomica........................	30 grains.
Ginger..............................	1 ounce.
Black pepper.......................	½ an ounce

into a ball with jaggery and give twice a day. Frictions of mustard-oil and turpentine to the affected limb should be applied night and morning.

MALIGNANT SORE THROAT

Is also an almost fatal contagious disease running its course rapidly by giving rise to a swelling of the throat attended by loud and laborious breathing; and eventually it terminates in suffocation of the animal. The disease commences with inflammation of the lining membrane of the larynx subsequently involving the tongue, back part of the mouth, throat and windpipe. Effusion of serum in the surrounding loose tissues and enormous distension of the parts take place.

Symptoms.—The disease shows itself with loss of appetite, suspension of rumination, fever, harsh cough, difficulty of breathing and of swallowing followed by great swelling of the throat. The animal is unable to move its head, which is protruded; there is great prostration of strength and a discharge from the nose and mouth which may become purulent subsequently. Pulse excited, skin hot, breath offensive, the tongue protrudes from the mouth, is swollen and dark-colored

and may have small vesicles interspersed over it. The animal may die in an hour or two, or hold out for as many days, according to the intensity of the symptoms. The danger from this disease is owing entirely to its situation and it may be counteracted by the timely operation of tracheotomy.

Treatment.—If the animal is able to swallow, give at once one pound of epsom salts dissolved in a quart or two of tepid water, but great care is necessary in the administration of the aperient to avoid choking the animal. The throat may be scalded in the usual way to raise an instantaneous blister, or the part may be fired with the red-hot iron either transversely from ear to ear or in parallel lines down the throat to the extent of the swelling. The mouth should be washed out with tepid water frequently to soothe parts and remove foul secretions. Large quantities of tepid water should be thrown up the bowels by an enema syringe so as to get them to act. The diet should consist of watery rice-gruel only; and should there be much prostration of strength, four ounces of country arrack might be added to each quart of gruel; or a pint of ghee may be given every four hours.

The first thing to be done in these cases is to isolate the animal. Should symptoms of amendment occur, evinced by the subsidence of the swelling and the lively appearance of the animal, the following with a sufficiency of jaggery to form a ball may be given twice a day for a week or ten days:—

Common salt........................	2 ounces.
Black pepper........................	½ ounce.
Ginger	½ do.
Red chillies........................	¼ do.

RINDER PEST.

This is a contagious fever arising from the presence of a specific poison, and frequently becoming malignant and assuming a typhoid type. Few diseases in their

earlier or later progress vary so much in form, which is apt to mislead as to the true nature of the disease. It is believed to originate from a specific poison and is the most contagious and fatal disease known among horned cattle.

Symptoms.—Dullness, staring of the coat, shivering followed by much heat of skin, mucous membrane of the eyes, nose and mouth greatly congested and at times interspersed with vesicles. At first, symptoms of catarrh, followed by short husky cough, appear. Thirst and spasmodic twitchings of the muscles of the neck and flank, or other parts of the trunk, are characteristics of the disease. Torpidity of the bowels is followed by watery evacuations containing undigested food. The stools become putrid, sometimes containing much blood or blood and slime, and are attended by great pain and straining, frequently followed by protrusion of the bowels. The appetite at first indifferent, now leaves the animal altogether, the body becomes arched and all four legs are drawn together. Rumination ceases. The pulse at first accelerated, now becomes feeble and scarcely perceptible, the muzzle grows dry, mouth hot; the visible mucous membranes are congested and discharge viscid mucous in varying quantities; the breathing becomes hurried and offensive; there is more or less tenderness along the spine; much prostration sets in, and the animal unable to stand, lies down, moaning, grunting and watching its flank.

The surface of the body and extremities grow cold, and the animal dies of exhaustion in from 24 hours to 10 days. In rare instances life may be prolonged to a fortnight. Between the third and fifth day of attack a pustular eruption may become visible, chiefly about the fore part of the neck, shoulders, ribs, udder, or groins; the parts may be attacked together or successively; or the eruption may be limited to one particular spot only.

The appearance of an eruption, especially when copious, is always a favorable symptom, as also the absence of dysentery.

Treatment.—These cases seldom come early under treatment, which is rendered difficult because the disease is occasioned by some specific poison acting as an irritant in the system, and therefore our chief object should be to support the strength of the animal by a nourishing but digestible diet, and thus aid the powers of nature to throw off the disease. On admission the patient should get 8 ounces of castor-oil with two drachms of laudanum, to clear the stomach and bowels of undigested food and acrid secretions. The castor-oil may be repeated once or twice if necessary, but overpurgation should be avoided; it should be followed up by two ounces of common salt, one ounce of nitre, and two drachms of laudanum, given as a drench in a quart of rice-gruel three times a day; but should indications of diarrhœa appear, two to four ounces of catechu should be added to each dose of the draught, or the following drench may be substituted.

Catechu, four drachms; powdered ginger, two drachms; black pepper, two drachms; jaggery, one ounce, and country arrack six to eight ounces, made into a mixture and given either alone or with rice-gruel three times a day; large enemas of tepid water should be thrown up twice a day to soothe the irritated bowels, and clear away vitiated secretions, the presence of which keeps up further irritation.

Mr. Veterinary Surgeon Thacker recommends the following:—

Camphor	2 drachms.
Datura	1 drachm.
Cheretta	2 drachms.
Arrack	4 ounces.

Dissolve the camphor in the arrack; powder and mix the other ingredients; then add two quarts of gruel

and carefully pour it down the animal's throat with a drenching horn. Mr. Thacker suggests two drachms of gallnut being added should diarrhœa exist. Great attention should be paid to cleanliness. The animal should be strictly isolated and kept in a clean, well-ventilated shed, and should flies prove troublesome, carbolic, camphor, or neem-oil should be freely applied two or three times a day to the eyes, nose, mouth and vicinity of the anus, and other parts attacked. Diet to consist of soft-boiled grains made into gruel with bran-mashes till the animal is convalescent, when fresh young grass should at first be given in small quantities.

RHEUMATISM.

Rheumatism is rather a common disease in some districts in India and results from inflammation of the fibrous tissues by exposure to wet and damp.

Symptoms.—The animal becomes dull and droops; there may be excitement of the system present, and some one of the larger joints may be found hot, swollen, and painful to the touch; the animal becomes lame. The heat, pain and swelling subside in a few days, when another joint may become similarly attacked.

This disease should not be confounded with lameness or sprains from accidents which result in heat, pain and swelling.

Treatment.—Give at once a pound of epsom salts with an ounce of ginger made into a drench with tepid water, and as soon as the bowels have been acted on freely, give two ounces of common salt with one each of ginger and black pepper twice a day, with a view to improve the general health of the animal and to give tone to the muscles. Hot fomentations should be used till relief is afforded, after which if the joints be well rubbed with the turpentine and mustard-oil liniment, any remains of pain and swelling will disappear.

SPLENIC APOPLEXY.

The spleen is liable to congestion or engorgement, but in this country it is more frequently found infested with hydatids, the result of starvation from scarcity of pasture during the hot season.

Symptoms.—An animal in condition becomes suddenly ill, staggers, foams at the mouth, breathes laboriously, stands with its head stretched out as if oppressed and moans: blood oozes from the nostrils or anus, and the animal dies in the course of a few hours from impoverished watery blood escaping from the engorged spleen into the abdominal cavity, or from rupture of the spleen itself.

Treatment.—The disease shows itself so suddenly, and terminates so rapidly, that much in the way of treatment cannot be carried out. When first detected the bowels should be acted on with a view to unload the engorged vessels. A pound and a half of epsom salts should be given as a drench in tepid water, and its action promoted by drinks and tepid water enemas. As soon as an impression is thus made on the system, an ounce each of common salt, nitre and ginger, made into a drench with a pint of rice-gruel, should be given three times a day. The diet should be attended to, and the object should be to improve the quality of the animal's blood by general attention to health.

TETANUS or LOCK-JAW.

This term denotes a disease, the principal feature of which is long continued contraction or spasms of a certain number of the voluntary muscles, with a highly excited condition of the nervous system. It is caused either by exposure to cold and damp, or injuries.

Symptoms.—At first a general stiffness is all that may be observed, and as this increases, the animal is unable to move its head either way; this is followed by inability to open the mouth or pick up food; next,

the muscles of the trunk become implicated, and lastly, those of the extremities; the animal falls to the ground with the head and extremities stretched out to their fullest extent. The back is slightly arched, the eyeballs retracted into their sockets and the tail drawn back.

Treatment.—Little can be done in these cases. Should the animal be able to swallow, a pound and a half or two pounds of epsom salts should be given as a drench at once, and tepid enemas should be administered, each enema to contain four ounces of turpentine. The animal should be kept quiet, and two to four ounces of laudanum given every four hours. Should the animal be unable to swallow, the laudanum may be given as an enema, or injected hypodermically. The disease generally proves fatal in from one to three days.

OPHTHALMIA.

Inflammation of the eye is frequently met with among cattle: it is the result of accident; or it is of idiopathic origin.

Symptoms.—Wounds of the ball of the eye with protrusion of the iris from injuries of the cornea may set up violent inflammation in the part; or the eye may become inflamed without injury of any kind.

Treatment.—Keep the animal quiet and give a good purge composed of 8 ounces of common salt, half an ounce of powdered ginger and two drachms of black pepper in the form of a drench. Tie a piece of cloth over the affected eye, and keep it constantly wetted with cold water till the active symptoms subside.

Sometimes a blister or seton may be called for, and should there be any haziness of the cornea, apply solution of nitrate of silver (5 to 10 grains to the ounce) night and morning.

DISEASES OF THE FEET.

Cattle in general, and working cattle in particular, are subject to diseases and injury of the feet which

may lay them up and prove troublesome, if not properly attended to. Stones, thorns and other foreign matter may insinuate themselves into the cleft of the hoof, and, becoming fixed there, may give rise to inflammation, swelling and pain, causing lameness. When anything wrong about the feet is suspected, the animal should be cast, and each foot carefully examined, and any foreign body found should be removed and the parts well washed. If any wound of the skin be found, a bandage should be applied around the part and the animal should be rested till well.

SPRAINS.

The muscles, or ligaments of the joints of the legs or the tendons may become ruptured or sprained, occasioning swelling, heat and pain, with lameness. When detected, the injured part, if near or connected with a joint, should be fixed by a splint and bandage and kept at rest, the bandage being kept wetted with cold water till the swelling subsides, when the part should be well hand-rubbed, and the animal made to stand in cold water for an hour or two daily till well.

DISLOCATION

Sometimes results from accident or over-exertion, a bone being put out of joint: the injury may be detected by 1. Change in the shape of the joint; 2. The joint being fixed or nearly so; 3. The limb shortened, sometimes lengthened, and the part swollen and painful to the touch.

In working cattle the shoulder bone is perhaps the most frequently dislocated. The reduction is easily effected by casting the animal, so as to have the dislocated joint uppermost, and then, seizing the arm and pulling it downwards, the bone may be heard to return to its socket with a snap, after which, rest and cold application to the part are all that may be necessary; but as it is an accident that is likely to repeat

itself, the animal will never be useful afterwards, and should be disposed of.

WOUNDS AND BRUISES.

Cattle are liable to injuries of the skin, the result of accidents occasioning a break in the continuity of the skin and leaving an open wound, the simplest of which, if neglected, is liable to become troublesome and infested with maggots. The skins of cattle are sometimes injured by each other's horns, and if the wounds be neglected they may burrow deep into the adjacent tissues. All that is necessary in wounds of every description to cattle is to keep the latter quiet and the parts clean, free of flies: use cold water applications to reduce the inflammation, after which the wound should be coated freely twice a day for some time with a mixture composed of half an ounce of aloes dissolved in two ounces of brandy. A mixture of chalk and oil is also useful in curing wounds. The preparation should be of the consistence of treacle, and after being poured on, the wound should not be disturbed, as the crust that forms will drop off of itself when the wound is healed.

HERNIA

Is a protrusion of some portion of the bowels through an interstice in the belly, producing a soft and slightly elastic tumour, otherwise known as rupture. It is most commonly met with in ventral hernia.

Symptoms.—A large soft tumour ranging in size from a hen's egg to a cocoanut, protrudes from the abdomen of cattle, the most common seat being the vicinity of the flanks; beyond the protruding it seldom gives trouble although liable at any moment to become strangulated, and unless strangulation has occurred, it should not be meddled with, for although the internal muscular wall of the belly has been ruptured, the skin is still entire. Should strangulation show itself, the tumour increases in size, and becomes tender to the touch, the animal moans, breathing is hurried, pulse

quick and small, rumination ceases and the bowels become torpid.

Treatment.—Taxes may be tried by gently seizing the tumour and compressing it, when the contents may escape and the strangulation be relieved; failing this, an operation will have to be resorted to, for which purpose the services of a Veterinary Surgeon will be required.

MANGE.

This disease may be dependant on general debility, characterised by a diminished tone of the vessels of the skin; it is a most serious disease and frequently the result of starvation.

Symptoms.—There is great itchiness, to allay which the animal constantly rubs itself. The coat is ragged and bare in parts, with scabs and sores interspersed over it; the animal begins to emaciate, a thick scurf appears along the back and in patches over other parts of the trunk.

Treatment.—Give a purge of common salt to clear out the bowels, and follow it up with common salt two ounces, sulphur four ounces, and ginger one ounce, twice a day in bran-mashes. Great attention should be paid to cleanliness. Isolate the animal and have it washed daily with soap and water, carbolic soap being preferable if it does not irritate the skin, after which the animal should be anointed with an ointment composed of two ounces of sulphur and four of sweet oil.

LEECH IN THE NOSE.

Leeches often worry cattle by entering and fixing themselves in the nostrils while cattle are grazing in damp localities. Their bites cause bleeding from the nose and the animal should be relieved of them as soon as possible.

Treatment.—Inject into the nostrils a little salt and water, and when the leech moves, seize and withdraw it with a pair of forceps.

BROKEN HORN.

The horn in cattle is an elongation of the frontal bone: the inner portion is hollow, and pierced with numerous openings, leading into cells communicating freely with each other, whilst the exterior is roughened. The cells are lined internally with the mucous membrane which is continuous with that of the nose. This bony protuberance is exceedingly vascular from the large quantity of blood it receives not only for its own nourishment, but also for the formation of the horny secretion which covers the bone, forming what is popularly designated the "horn" proper, which consists of a number of thin plates welded together. The horn is thin at the base, and is in continuation with the cuticle but thickens, grows solid and pointed as it reaches the tip.

The horns are subject to accidents and are injured by falls, blows, or when the animals struggle with each other in a fight. The fracture bleeds most profusely and may even endanger the animal's life. The horns of cattle are liable to three kinds of fracture:—

1. The bone may be broken, the horn not being detached, and there being no open wound. In a case of this kind, all that is necessary is to support the parts with a splint and bandage to keep them steady and at rest, and the fracture will unite in the course of 2 or 3 weeks:

2. The horn alone may be torn away leaving the bony process bare and bleeding. In this case some astringent, such as powdered catechu, gallnuts or alum, will have to be used to arrest the bleeding, and the parts should be bandaged with an oil cloth to keep flies off and protect the tender part from exposure to air. The horn will not grow again, but a thin skin will grow over and cover the exposed bone:

3. Both bone and horn may be snapped off clean, leaving a large open bleeding wound, communicating

by its numerous openings with the nasal cavity, and, if neglected, fungous growths will protrude from it: flies get access and breed maggots which may find their way into the skull, and give a great deal of trouble, or the animal may even be carried off with inflammation of the brain or lock-jaw. The best thing to be done in such cases is to saw the horn down on a level with the wound and make the surface smooth, over which an iron heated to a black heat should be passed to arrest bleeding. The *eschar* will prevent air from getting at the wound which will eventually heal underneath, and the crust will drop away. When necessary, as for instance, when fungous granulations make their appearance, astringents, such as catechu, gallnuts, alum or blue stone should be freely applied and carbolic acid oil liberally used, to prevent the discharge from becoming offensive. In time the wound will heal, new skin will be formed over it, and all further apprehension will be at an end.

INFECTIOUS DISEASES.

There are several diseases cattle suffer from which are both infectious and contagious, and if care be not evinced in the protection of the animals during the prevalence of these diseases, they will readily succumb to any one that happens to prevail. During seasons of sickness cattle should be inspected daily with a view to detect disease at the onset, and should any animal be seen with the eyes dull, the root of the horns hot, and the nose hot, dry and scurfy, it is a certain sign that some distemper is stealing up. At the same time the hand should be passed along the backs leaning slightly; should the animal shrink and give way to the pressure, it certainly is ill. It may most probably have taken a chill or cold, and it will require to be separated from the other animals and have a dose of aperient, &c.; or should an animal be off its feed and go about in a careless unconcerned manner, it will be a sign that it is not well and requires attention. On the contrary,

a certain sign of health may be ascertained by observing each animal's nose as you go your daily rounds; if pearls of moisture like due drops hang therefrom, the animal is well.

The most infectious diseases are rinderpest, anthrax fever, foot and mouth disease, or epizootic aphtha and pleuro-pneumonia. These are the most baneful: they are not only infectious but contagious, and may be communicated either directly from animal to animal or indirectly by the attendants or by infected pasture-grounds, water-courses, stalls or other places to which the sick have had access. The diseases are thus propagated when least suspected.

PREVENTIVE MEANS.

As soon as it becomes evident that an animal is ill it should be removed from the place, so as to prevent all possible contact with other animals, and all litter or forage left behind should be destroyed and the place be well cleaned and the walls, stakes, &c., lime-washed and the soil also well sprinkled with lime solution; from one to four ounces of sulphur should be burned at the place or windward of it two or three times a day for a few days, and if the place be open, a tat or two should be put up so as to arrest the fumes for a while in their passage, ere complete diffusion takes place. Those attending on the sick beasts should be prevented from having anything to do with the healthy animals: should these precautions be taken in time it is possible to stamp the disease out of the locality.

Care should be taken to have the carcases of all animals that die buried as soon as possible, as they are liable to rapid decomposition and the poisoned secretions soon begin to ooze from the mouth, nose, bladder and bowels, which are certain to infect the locality; and as most of these infectious diseases, more especially rinderpest and epizootic aphtha, generally prevail in most parts of India, now in one district and then in

another, (and the type of the disease varies both in its severity and duration), care is necessary especially where large herds of cattle are kept. The assembly of cattle in herds daily for the purpose of being driven out to graze is a common source of propagating disease from one animal to another in the towns and villages. Cattle taken to the different fairs for sale sicken readily from the fatigues of marching, and then mixing with others brought for the same purpose are often the cause of propagating the disease from one to the other. Animals purchased at fairs should not be introduced immediately among other cattle ; they should be kept apart for two or three weeks to remove all suspicion of infection. During travels cattle are peculiarly subject to take infectious diseases. When such are prevalent, they should not be herded near villages, but at a distance from them and in the open. When large numbers of cattle are kept together and any infectious disease shows itself, the herd should immediately be broken up into detachments of 20 or 25 and be driven away some few miles apart. The different detachments also should be kept apart from each other and from the infected locality till the place is quite free of the disease. There should be no communication whatever between the various detachments whilst disease is prevalent, and a certain locality at a mile or two from the village should be fixed as a hospital to which all infected animals should be removed the moment they give indications of being ill and be there treated.

PROPHYLACTIC MEASURES.

A good plan, and a very successful one, is during periods of illness to give to each animal from a quarter to half an ounce of common salt daily. Cattle are particularly partial to salt, and when they have once got the taste of it, they will follow the cowherd to any distance when the basket containing the salt is shown them. I have seen a semi-wild herd follow a European

and eat salt out of his hands, if they knew he had it, whilst at other times the animals would not allow him to approach within a distance of 20 or 30 yards without fleeing or threatening to charge. Salt is a very necessary article in the maintenance of the health of cattle. A good plan is to get blocks of earth-salt, which can be purchased in most bazaars, and to place them out in a yard or other spot to which the cattle can have free access; and as they feel the want of salt, they will get to the block and lick it freely. The natives place the utmost faith in hog's lard as a prophylactic, and as soon as any disease shows itself, those who can afford it, at once smear the mouth and nose of the healthy animals with the lard, and administer from half to one or two ounces daily whilst sickness exists in the locality.

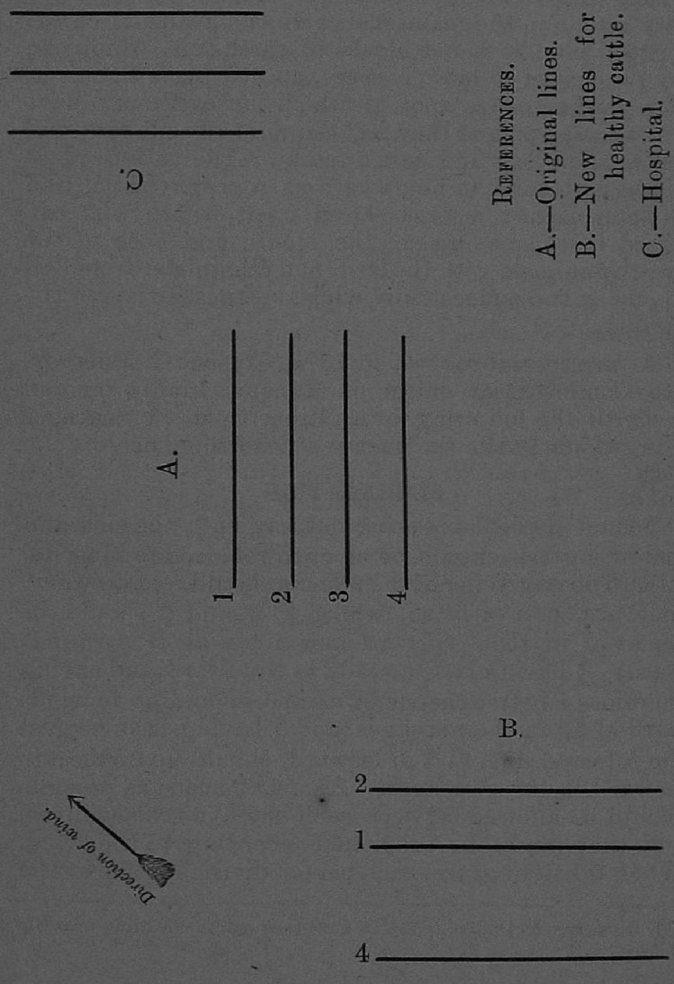
At my special request in 1878, Colonel C. McInroy, the Commissariat officer at Hunsur, kindly favored me with the following interesting paper on Segregation, which I take the liberty of inserting here.

SEGREGATION.

"On dod-rógá[1] breaking out, say in $\frac{A}{3}$, the sick animal or animals should be at once removed to Hospital (C). The remainder of $\frac{A}{3}$ bullocks should remain where they are, or nearly so, whilst $\frac{A}{4}$, $\frac{A}{1}$ and $\frac{A}{2}$ should be removed in *that order* to new lines at B (to windward); $\frac{A}{4}$ having been already to windward, and having therefore a better chance of escape, should go to windward of all in the new lines, and $\frac{A}{2}$ having been nearest the infected line, and to leeward, should be furthest to leeward in the new lines. As much space as possible should be allowed between each batch in the new lines, and they might be echeloned according to the wind. When taken to graze, each pál (or division) to be loosed

[1] Rinderpest, Dod-rógá is the Canarese name meaning the Big disease.

and taken away separately, but all to windward. The distance between A and B, or A and C, should in neither case be less than 500 yards."

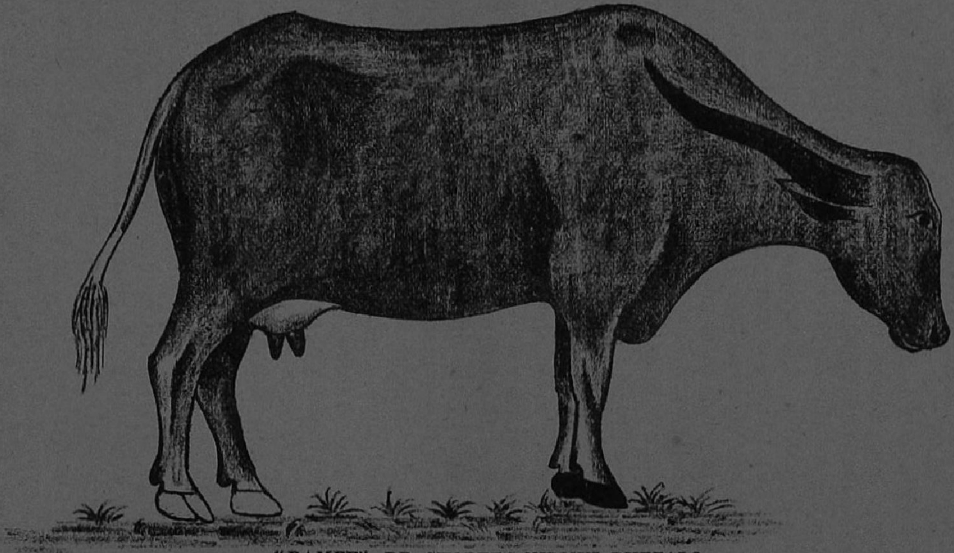


"*Treatment.*—Blow or pass McDougall's disinfecting powder up the nostrils of all animals, affected or not, and scatter the same, as also a solution of carbolic acid (25 or 30 parts of water) liberally over the skins of the animals, also throughout old and new lines. Burn sulphur, so that the fumes may be inhaled by *all* the cattle, and use the ordinary remedies on the cattle attacked."

"I cannot say why it was, but the fact remains that by the above means, on the first and only occasion (March 1877) that dod-rógá broke out amongst the young male cattle (which are handled and tied up daily), I not only succeeded in arresting the disease (*15* attacks first day, *2* on the second day, *nil* on the third and following days), but every single case recovered—a perfectly unparalleled case, I believe, in the annals of dod-rógá. I have cured several cases since amongst private cattle. I have been asked to make this public, but was anxious to try further experiments before doing so, as, however natural it may be that segregation and disinfectants should arrest the spread of the disease, it is difficult to understand how the affected cattle were cured. However, I have no objection to this being now published, in the hope that others may try the plan, and communicate results."

To face page 107.

PLATE 12 A



"RAMEE"—DR. SHORTT'S NIRMUL BUFFALO.

Height to top of shoulders, 43 inches. Length from crest of horns to stump of tail, 69 inches. Length of horns from base to tip, 28 inches.

Has a white star on the forehead, and both hind cornets, and 6 inches of tail with tuft white. Girth around the trunk next the elbow, 65 inches.

G. Packsensky, Lithog. For Higginbotham & Co., Madras.

THE BUFFALO.

The Buffalo or *Bos bubalus* stands next to the Ox in its utility to man, and still exists in a wild state in large numbers in many districts. The wild buffalo is scientifically known as the *Bubalus arni*, occupying swampy sites in the vicinity of jungles of the districts in which they are found. There is scarcely an animal upon which domesticity has made so little impression as the buffalo. The tame being still most clearly referable to the wild ones living in large herds except during the rutting season in the swampy jungles of India; whilst the tame buffalo is universal and found all over India distinguished by its large flat horns, some curved, and some long, measuring often as much as 6 feet in length and 18 inches in circumference at the base; of dark-blackish color, often varying in some varieties into dark or light-grey with scanty hair, but with tufts of hair in various parts of the animal. Length, 10 feet from snout to root of tail, which is short, not extending lower than the hock; height at shoulder, from 3 to 6 feet. The domestic buffalo is extensively used in India, both for draught and as milch cattle; they are much appreciated by certain class of natives. The buffalo inhabits Thibet, but is domesticated in India, the Indian Archipelago and Southern Europe, and is the only indigenous ruminant of Ceylon. Since its introduction into Italy it is largely used as a beast of burden. The finest of the domesticated buffaloes of India are reared in the Hyderabad dominions west of Neermul, and I have seen splendid specimens of them at Jalna of huge size and spread of carcase with prodigious horns; frequently among them are met with "albinos" with pink eyes and a white star, large or small, on the forehead, with 2 or 4 white "stockings" and white tuft of tail. These animals are greatly esteemed as

milch kine, as they yield from 6 to 12 seers[1] of milk in the 24 hours. The cows are generally reserved for the dairy, and realize in the market from 70 to 100 rupees each, whilst the males are castrated and exported to other districts for sale, often realizing from 100 to 300 rupees each, as beasts of burden and draught; whilst the majority of natives prefer the milk of the buffalo to that of the cow from its abundance and being much richer in cream, turning out a larger proportion of butter and ghee. A fine large breed of buffaloes are met with in the northern districts of this Presidency. I inspected some large herds of them in the Purla Kemedy Hills in 1870. They, for the most part, belong to the Purla Kemedy people, who keep them on the hills to enable them to find their own pasture. Large quantities of milk is sent down to the plains, besides what is converted into ghee, for transport. At night the buffaloes are herded in the most sheltered part of the valleys, where the herdsmen erect temporary huts for themselves. I was somewhat surprised to see the ingenuity practised by the herdsmen to keep the calves from sucking their dams whilst out grazing; during the day two pieces of forked sticks, each having a couple of prongs, are tied over the bridge of the nose, somewhat in an oblique direction, and fastened firmly with cords at the back of the head and under the jaws, so as not to interfere with the calves grazing freely, whilst they effectually prevent them from sucking; for when they approach their dams the sharp prongs of the forked sticks hurt them about the udder, so as to make them kick and go away from the calves, and thus without any extra trouble, for, though the calves are taken out with the dams, they are effectually prevented from drinking up the milk. In many parts of the Deccan it is the practice not to milk the buffaloes on Sundays, but to

---

1 Three seers are equivalent to two Madras measures.

allow the calves to have the full benefit of the milk for that day, with the object of benefiting the calves. Though the buffalo, generally speaking, is an ungainly animal, he can be trained to great nicety. They are trained in most parts of India to allow sportsmen to approach waterfowl under their cover; in the cart they are used without a nose or head string and are guided in their movements by the touch of a wand and at the bidding of the driver; they also lie down at his bidding, and in most respects are obedient to the master's order.

The following account of these animals I give from Rice's Manual of Mysore:—

"Of the buffalo there are three varieties, the Hullu, the Ganjai or Gujarat, and the Chokatu which comes from the country bordering the river Krishna.

The Hullu is by far the most common, and is the native breed of the country—the female has a calf every year and gives milk for seven months; besides what the calf draws from her, she gives twice a day about a quart of milk; she generally bears from 10 to 12 calves, and is very unruly when the keeper attempts to milk her without the calf being present. They will convey a greater weight, either in a cart or on the back, than a common ox; but walk very slowly, do not endure the heat, and cannot easily travel more than 7 miles a day.

The two stranger breeds are greatly superior in size to the Hullu, but in this country they very soon degenerate. The females breed once in two or three years only, and produce in all about 6 calves. For 2 years after each parturition they continue to give a large quantity of milk, but in the 3rd year their milk begins to diminish, and it entirely ceases about 2 months before the time of calving. In this country, besides what the calf is allowed, they give daily from 6 to

8 quarts of milk and require no more food than the common breed, neither do they refuse their milk should the calf be removed or die. The males are entirely reserved for breeding, or for carrying loads; one of them will carry as much as 6 oxen and will walk faster." Buffaloes are coarse feeders, living on the coarsest of grass and the refuse of oxen generally; notwithstanding their size they are delicate animals, and are very subject to disease; their ailments are the same as those of cows and the treatment much the same, except that they will require a larger dose of medicine than that usually given to the cow. It is best to give the same dose, but to repeat it oftener, say once in every 4 hours, till some effect is produced.

Milch buffaloes have the same food and other treatment similar as that given to the cow.

Calves.—Buffalo calves are much more delicate and difficult to rear than cow calves, they sicken very readily and die off rapidly. Some care and attention is necessary in regulating their supply of milk. In cases of illness they are treated much in the same manner and with the same remedies in similar diseases as those given to cow calves in general.

The Toda buffalo is pretty well known to the frequenters of the Neilgherry Hills, where each Toda mund possesses a herd. They differ from the kind generally met with on the plains, and appear to be indigenous to these hills alone. They are of exceedingly powerful build and long in carcase, they have scarcely any hump; the chest is broad and deep; the legs short and sturdy; the head large and heavy and surmounted by horns set wide apart and curved differently to those of the animals seen on the plains, the points being recurved inwards, outwards and forwards; they carry

their heads low, and from this peculiar curvature of the horns, it gives them at first sight a bull-dog appearance. Along the crest of the neck, hump and back there is a thick growth of hair like a mane, which imparts a bison-like appearance to them. They are known to be fierce and rather dangerous to approach incautiously; at sight of a stranger they throw up their heads, run back for some distance, when they abruptly halt and turn towards the object of their fears, at whom they fiercely stare with heads erect, cautiously advance and retire, and gather together in a compact mass prepared for attack. At other times the whole herd start suddenly into an impetuous rush, with their heads carried low and overrun, gore or trample to death the object that has excited their anger. In this manner tigers and other beasts of prey are often kept at bay or killed by the simultaneous rush of the herd. They are good milkers, yielding daily from five to nine quarts of very rich, well-flavoured milk. Beyond this they are put to no other use whatever. Of late years these buffaloes have suffered from murrain and other diseases; and these fine animals are said to be fast diminishing in numbers. The cows are milked both at night and in the morning, but the principal dairy operation is conducted before sunrise. The "tuel" or pen is a circular enclosure, varying in size according to the number comprising the herd, built of a loose stone wall with a single entrance, guarded by powerful wooden stakes, in which the herds are shut in for the night. It is generally located in some sheltered spot and embanked to the height of 3 or 4 feet. During the rains, the windward side of the pen is bushed with brushwood, to protect the herd from the cold, piercing winds. These pens have no covering above; the cattle are exposed at all seasons to the rains and sun, while

the floor is covered with an accumulation of their own droppings. The young calves, however, prior to being weaned, are very carefully looked after and kept under shelter at all times of the year; during the day the calves either accompany their dams or are grazed separately under the care of an attendant. In the Orissa jungles, the herdsman pickets his buffaloes in a circle and sleeps at night in the centre of the herd, where he is said to be perfectly safe from the molestation of beasts of prey.

Note.—The immense horns of South African cattle are made to twist spirally and in fanciful curves by being scraped on one side or the other while they are growing. Each owner can in this way, by the acquired shape of the natural regular horns, tell the oxen that belong to his "span."

THE INDIGENOUS BREEDS OF SHEEP IN THE MADRAS PRESIDENCY.

The sheep belong to the family *Bovidæ*—sub-family, *Caprinæ*—genus, *Ovis*—the specific scientific name being *Ovis Aries*.

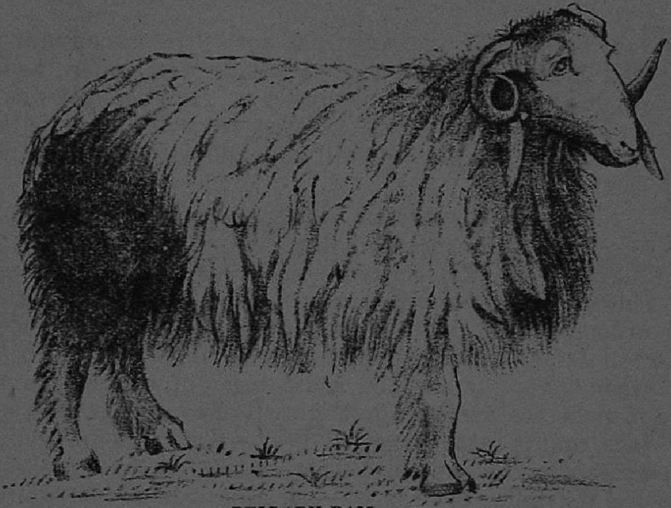
Character.—Horns in both sexes, large, angular, heavily wrinkled, turned downwards almost into a circle, with their flat points directed forwards and outwards. No muffle; no beard; Chaffron convex; large but immobile eye, pits in some, wanting in others; small feet-pits in all feet; inguinal glands distinct; two mammæ.—*Jerdon.*

The common sheep is subject to great variety, like most of our domestic animals, but all merging into one known to the naturalist as *Ovis Aries;* and the wild sheep is said to be met with still in parts of Upper India and Europe. Blyth, an eminent naturalist, considers the fighting ram of India to be descended from the *Ovis Vignei* (Cycloceros). The history of the sheep is coeval with the creation of man, and is frequently alluded to in the Scriptures and other sacred writings. The lamb is considered the emblem of innocence. The immemorial custom of the East is still continued in India, for the shepherd leads his flock. Sheep differ greatly in their form, size, coating or covering, and weight, in the different districts of India, these depending entirely on the climate, soil and pasture-producing powers of the localities in which they are bred. The peculiar conformation of the mouth of the sheep, the lips being protected by hair, and the upper lip presenting a cleft, enables it to take a good close bite, much closer to the ground than cattle in general; and, for this reason, the sheep

can thrive even on scanty pasture. The sheep is too well known to need any particular description, as a whole; but the different breeds or varieties met with in India generally will be first reviewed, and with that object a beginning will be made with the Nellore District.

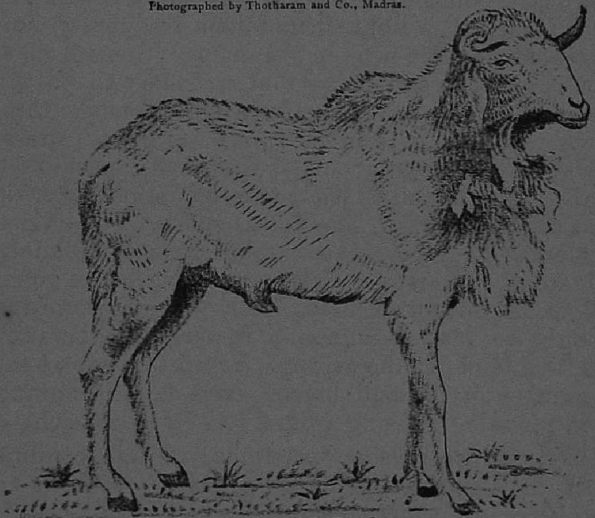
Nellore.—This district is famed for its large breed of sheep. The sheep of this district is the tallest in India: a good specimen stands across the withers thirty to thirty-six inches in height, about the same in length from point of chest to end of tail, and, when well fed and fattened, will weigh from 80 to 100lbs., when alive. It has the usual form of twisted horns of moderate size, with a slight Roman contour of the face, and is rather leggy and tall—the rams generally exceeding the ewes in height by two or three inches. The prevailing color is white or a light brownish-white with black points; the body is well covered with short fur (hair), with a light frill of hair frequently lining the throat and fore neck in the males. Some have two long rounded pendulous lobules, from two to three inches in length, hanging side by side from the throat, which the natives term in Tamil "*munnie,*" literally "*bells.*" The hair about the posterior part of the thighs, from the tail to hock, is longer and thicker than in most other parts. The tail is short. The ewes are hornless. They are of the same color: they milk fairly, and are good nurses. These sheep are active animals and make good travellers. The yearling lambs are brought to Madras annually in large numbers to be sold, and fetch, on the average, from 1 to 3 rupees each. A number of old and barren ewes are also brought down for sale, realizing from 2 to 3½ rupees each.

Good fat wethers or pet-rams, in fair condition, ready for slaughter, fetch from 5 to 7, and the very best 10 or 12 rupees each. Many of this breed of sheep are tall and lanky with no body or carcase of any size to show, and will scarcely weigh from 50 to



BELLARY RAM.

Photographed by Thotharam and Co., Madras.

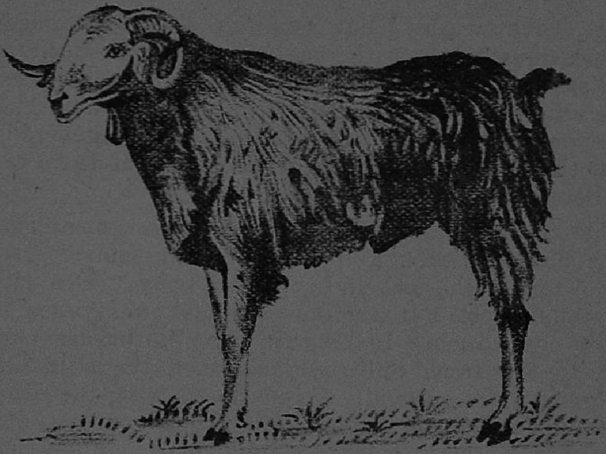


NELLORE RAM.

Photographed by a Native.

G. Packzensky, Lithog. For Higginbotham & Co., Madras.

To face page 115.



MR. J. D. B. GRIBBLE'S RAM-
-CROSS BETWEEN NELLORE AND MYSORE.

MR. J. J. CORBETT'S HORNLESS RAM, WITH MANE.

G. Packzensky, Lithog. For Higginbotham & Co., Madras.

60lbs., (live weight); but some excellent specimens are occasionally met with, having shorter legs, with a good sturdy form and a compact flesh-forming carcase: these animals will weigh from 60 to 100lbs., live weight. It is from animals of this form that natives generally select their pets; and in this respect some of them are excellent judges.

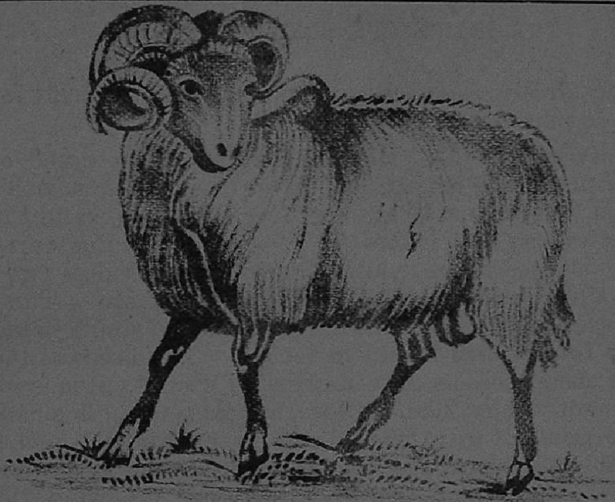
The Madras sheep is well known. It resembles a greyhound with tucked-up belly, having some coarseness of form; the feet light; limbs bony; sides flat; and tails short. It seldom exceeds twenty-two to twenty-eight inches in height. The horns are confined to the rams only, which, when the animal is well-grown, are generally of fair size, having the usual twist. These sheep have slight Roman noses, and large ears in some instances, and small pointed ones in others. They are covered with short, coarse hair, the prevailing color being red or brown, of which there are various shades, and many have the "bells" abovementioned depending from the throat. The ewes are an inch or two lower than the rams; they make fair nurses and milk well. A variety of this sheep is sometimes met with, in which the rams are hornless, the throat and fore neck lined with a thick shaggy coat of hair, extending like a frill from the throat to the breast, and often reaching to the knees.

This Madras breed of sheep is found in the Chingleput, parts of the Kistna, Godavery, Ganjam, North Arcot, South Arcot, Salem, Trichinopoly, Tanjore, Madura and Tinnevelly Districts. The only difference in any of these districts is that, in some places, where there is better and richer pasturage, the sheep may assume a better form, and they may even be an inch or two taller or shorter. With these exceptions, there is no other peculiarity whatever to be met with among this breed. In Ganjam and parts of the Godavery District I found the sheep mostly mottled, white and brown in color. Neither the Madras, nor the Nellore

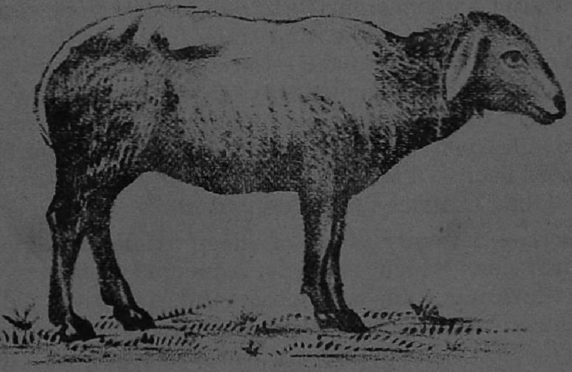
breed already described, furnishes wool or hair fit for textile purposes.

Coimbatore.—This district is famed for a breed of wool-producing sheep. It is, on the whole, a small breed, the rams seldom exceeding twenty-six, and the ewes twenty-two inches in height. The rams carry large twisted horns, whilst the ewes are hornless; the prevailing color is white with a black head. Their carcases have a fair covering of wool, the staple being from four to five inches in length. The fleece of the best sheep seldom exceeds 3lbs. in weight: it is more frequently 1 or 2lbs. These animals, though small, have good sturdy forms, and fatten well. The fat mutton they turn out is exceedingly rich and well-tasted; and, when the sheep has been gram-fed, the flesh has been pronounced by connoisseurs in such matters to be equal to English mutton. The sheep of this breed carry good, square, compact carcases; and their weight ranges from 50 to 60lbs., and very rarely 80lbs., live weight. The rams fetch from 2 to 5 rupees, and the ewes 3 rupees each; but at the weekly fair at Coimbatore and other places, yearling lambs may be purchased at the average price of 2 rupees or 3 rupees a piece: but pet-rams in prime order realize from 5 to 10 rupees each. This breed is generally imported into the Malabar District from Coimbatore.

Mysore.—A woolly breed of sheep exists throughout this province, which is fairly esteemed both for its mutton-forming and wool-producing qualities. The rams have large heavy horns wrinkled and encircled outwards, and their points inwards and forwards. The head is large and heavy-looking, with a prominent Roman nose. The ears are of moderate size and pointed, and the tail short, never exceeding 3 to 4 inches. The ewes are mostly hornless. They are occasionally met with small light horns, seldom exceeding 3 to 4 inches in length. The prevailing color is from a light to a very dark-grey or black. The ram stands twenty-



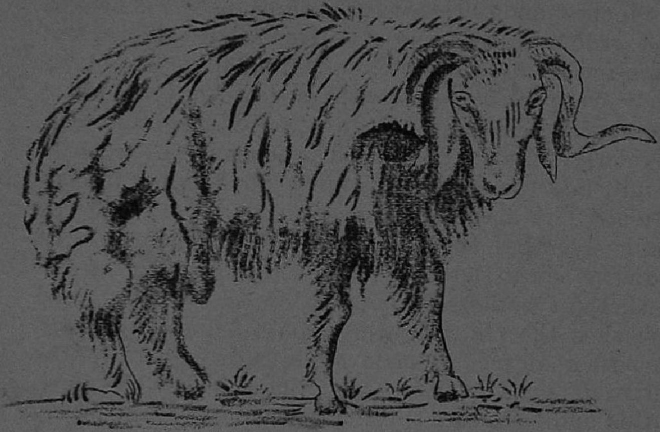
COIMBATORE RAM.



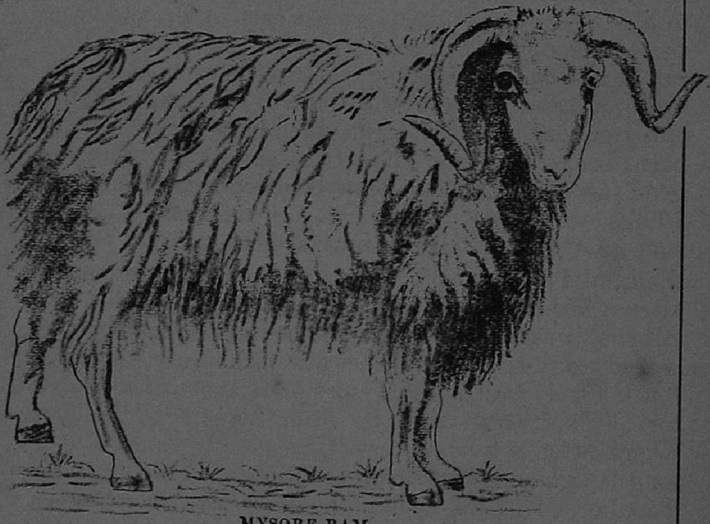
DR. SHORTT'S COIMBATORE EWE, RECENTLY CLIPPED.

G. Packzensky, Lithog. For Higginbotham & Co., Madras.

To face page 117.



DUMBA, OR FAT-TAIL SHEEP.
Photographed by Thotharam and Co., Madras.



MYSORE RAM.
Photographed by Thotharam and Co., Madras.

G. Packrensky, Lithog.

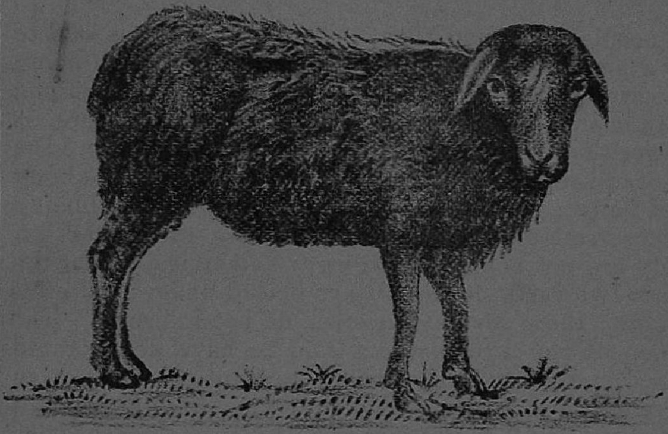
For Higginbotham & Co., Madras.

five inches, and the ewe twenty-three inches, in height. The ordinary live weight is from 40 to 60lbs., but gram-fed wethers attain from 60 to 80lbs. They have fairly compact carcases with good width, prominence and depth of chest; the body is well-woolled and rectangularly formed; in picked specimens the counter is full, and the shoulder is fairly filled, when in condition. The fleece never exceeds 3 to 4lbs., and the staple averages three to four inches in length. An ordinary sheep fetches from 2 to 3 rupees in the market, fat wethers 7 to 10 rupees each. This breed furnishes the chief fighting rams of India, for which purpose good picked male rams are sought after by native Rajahs, Zemindars and others. They are much petted and pampered till they grow quite savage; they will butt, and also strike with their fore feet; and I have also seen, in one or two instances, a propensity to bite. They are pitted against each other, and large sums of money staked on the result. In fighting, they run a tilt by first moving backwards some short distance, to add force to the impulse of their weight; and frequently in the fight, they have their heads or horns broken. These rams, from special selection and good feed, often attain thirty inches in height and over 100lbs. in weight. Size does not necessarily ensure success in the battle, as I have seen the largest ram of the kind I remember ever having met with, run away after a few tilts from one that was very much smaller. All the breeds of sheep in India are pugnacious and reared to fight, the preference always being given to the black woolly breeds of Mysore or to those of Coimbatore. This breed extends from Mysore to Bellary, where, after a time, the wool frequently changes into long lank hair. Mysore also exports its sheep to South Canara. Mr. Rice in his Manual of Mysore describes the sheep of the Province under three varieties, these are locally called the Kurumbar, Gollar, and Yellaga; these sheep derive their special names from the caste

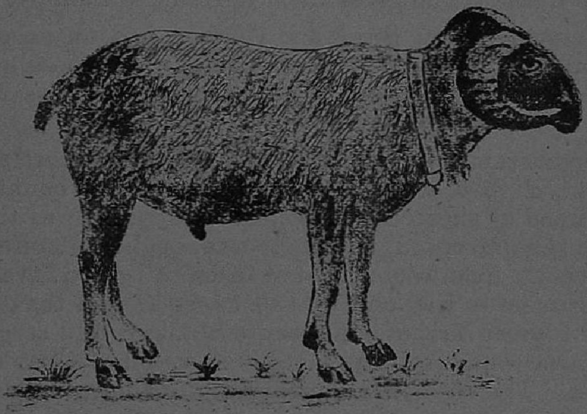
of people who keep them. The Kurumbar is said to be a small woolly breed, both its wool and flesh being superior to the others. The Gollar is a larger animal with coarse wool, and the Yellaga, which is rare, is larger than the others but less bulky, with more the appearance of the goat in the structure of the body and limbs; this variety is never shorn, the wool being too coarse for manufacture. Of these the Gollar variety are not housed at nights, at all times, whilst the other two varieties are always placed under shelter at nights; these several varieties do not intermix. The sheep of the Province are said to have deteriorated much in quality lately, owing to want of attention in breeding and tending, and they are solely dependant on pasturage. Kurumbar and Gollar sheep are shorn twice a year, fifty fleeces amount to about a maund weight. The wool is all coarse and is made into rough kumblies. The shepherds usually hand over 100 fleeces to the weaver, who gives them in return a kumbly.

For many years Sir Mark Cubbon had an experimental Sheep Farm at Heraganhalli, Nagamungala Taluq, under the charge of a European Commissariat subordinate officer.

Merino rams were imported yearly from Australia and the cross-breeds distributed all over the country. The breed of sheep throughout the Province was thus immensely improved, both as to size, quality of mutton, and wool. The wool was sent in bales by the Mysore Government to England for sale as well as for the purpose of being manufactured into blankets and serges. The farm was given up in 1863 as it did not pay expenses. This was owing apparently to sheep-breeding alone receiving attention; if other branches of farming had been combined, the results would probably have been more favorable. Patna in Bengal produces a fine breed of woolly sheep; they are of good size and form, and are greatly esteemed for their mutton-producing qualities; they also yield a small but fair



DR. SHORTT'S MYSORE EWE, RECENTLY CLIPPED.



DR. SHORTT'S MYSORE RAM, RECENTLY CLIPPED.

G. Packrzensky, Lithog.

For Higginbotham & Co., Madras.

supply of wool. These sheep are exported over most parts of Bengal, and even to some of the Madras districts. The rams are often in request for improving other breeds. They have been used in the Madras Farm, to improve the breed of the farm sheep, in conjunction with other breeds. I saw some very fine wethers at Cuttack in 1855 and 1856, imported by the mutton-club of that station. They come earlier to maturity, are good and rapid feeders, and produce a larger proportion of mutton generally.

As regards imported animals, a few of the *Heeratee* or Persian sheep are frequently imported into South Canara by Arab ships, and they are sometimes brought to Bangalore and Madras as curiosities by Arab horse-dealers. There are varieties of what is known as the *Dumba* or broad, or fat-tailed sheep, the caudal extremity forming a huge lump or mass of fat. Their tails, however, frequently give trouble: if not attended to carefully and kept clean, ulcers form; and the parts get readily infested with fly maggots, so that the sheep eventually die. The mutton from these animals is said to be coarse. A pair I imported from South Canara in 1870, died of the *scab* as soon as they got to Bangalore; and a lamb from these died of the rot when one year old on moving it from Bangalore. I have recently had two Dumba rams and still have one.

I have been greatly interested in a four-horned sheep imported into Madras by the late Colonel Macaulay, Commandant of the 37th Grenadiers. This ram had not only four horns but a fat tail also, which was small, pear-shaped, and pendulous. The ram is now dead; but the Colonel succeeded in obtaining from him a couple of lambs, male and female, by a Mysore ewe. The young ram had also four horns; and his sister had two horns. Both the mother and the daughter afterwards had lambs at their sides by the young ram. These animals have all died since this paper was written, except the ram and a male lamb, both of which

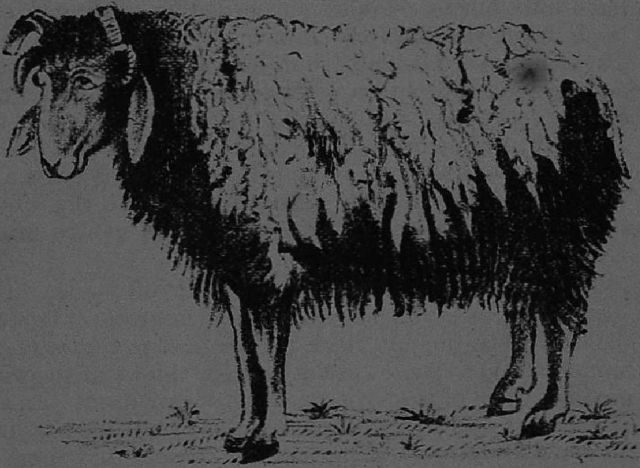
have four horns. I also succeeded in getting a ewe lamb from the old ram now dead by a Nellore ewe. These sheep are large both in height and bulk of body, and are covered with a pretty good fleece of soft wool. I have recently seen a ram with one horn at the Lalbagh, Bangalore. This animal was bred in one of the districts and sent to the Lalbagh as a curiosity. This is evidently a freak of nature, as both the horns appear welded together into one at the centre of the skull.

To return to the indigenous sheep of India. The shepherd gives his sheep no particular care beyond that of pasturing his flock in the best grounds in his immediate vicinity. No native ever thinks of growing green food or of preparing fodder of any kind. In the day the animals pick up what they can from the pastures they are driven to; at night their owners fold them in fallow fields or other open grounds, leaving the shepherd, with some three or four pariah dogs, to watch over them and to keep out beasts of prey. The rams or tups are never separated from the ewes, nor does the shepherd ever think of weaning the lambs.

The ewes, as soon as they drop their lambs, are daily stripped of their milk. No selection is made as regards the serving tup being the largest animal, the preference being frequently given to the one with the greatest pair of horns, without regard to his size or conformation. Numbers of young rams also, from one to four years old, continue to roam among the flock. The shepherd never thinks of gelding his young rams; this operation being left to the butcher or others, who purchase a few and convert them into wethers with a view to subsequent sale. Ryots frequently purchase a lamb to make a pet of, but when it has grown fat, they sell it to the butcher. The mode of castration is conducted by drawing the testicles between two wooden rollers, that are tied together at one end, and passed between the scrotum and the abdomen of the sheep,

To face page 120

PLATE 18.



COLONEL MACAULAY'S FOUR-HORNED RAM.

Drawn by T. G. Kelly, Esq.

ONE-HORNED SHEEP.

Sketched by a Friend.

G. Packzensky, Lithog.

For Higginbotham & Co., Madras.

when the other ends are tied. Against these the glands are pressed to break them, and then they are crushed into a pulp with the fingers. More frequently, both the glands are drawn between two pieces of a bamboo slit into two, and tied together at either end; and the glands thus tied are rested on a stone, and with a second stone they receive a strong blow which breaks them up within the scrotal sac. They are then pulpified with the fingers; the part is smeared with a little cow-dung, and the animal is let loose. This operation is never practised till the sheep has shed either four or six of its milk-teeth and replaced them by permanent incisors. Frequently, the operation is never thoroughly completed; as a rule, a portion of one or both glands continues unabsorbed, and the sheep has thus not been fully emasculated. It retains much of its masculine form and its horns even may grow at the same time. I think this method of castration preferable to any cutting operation, as I have lost 50 per cent. by the cutting process and have given it up as a hopeless job, after trying the heated iron, saw, ligature and clamps, to divide the cord. On the twelfth day, almost to a certainty, the animals operated on get tetanus or lock-jaw, and are dead by the fourteenth or fifteenth day; any medical treatment proving of no avail whatever. In England the male lambs are generally castrated before they are weaned, and no other but the "cutting" operation is resorted to, by making a small incision at the end of the scrotum, the glands one after another are forced out and are drawn out from their attachments by the shepherd generally using his teeth to seize and tear the glands away, invariably with success; more recently an instrument has been invented for seizing and tearing the exposed glands away.

The native shepherd or proprietor of sheep never, as a rule, supplies his sheep with any artificial or other food, green or dry, beyond what the animals can pick

up at the pasture-grounds; thus, during the dry season, they are frequently brought very low from the want of pasturage, and the "*rot*" attacks the flocks and kills a great many. During the monsoons, flocks of sheep suffer much, the sharp winds being inimical to their health, and thus numbers die. The shepherd never thinks of housing his sheep at nights at any time of the year; but he will, from practical experience, drive his flock to ground where he can take advantage of rocks, hedges, trees or houses in the vicinity, so as to protect them from the cutting winds: and folds them for the night on high and dry ground; and, with this object in view, he resorts to all sorts of shifts. I don't believe that, as a rule, he obtains more than one lamb annually. According to my experience, I have invariably obtained three lambs in two years, and should the first lamb dropped prove to be a ewe, she produces a lamb before the end of the second year; and thus the produce is four instead of three lambs in two years. I have not seen twins yeaned in any part of India, except Orissa, in the vicinity of Cuttack, where a small breed of sheep is met with, which the natives call "*Dessi*," or country sheep; these, I believe, mostly yean two lambs at a time. A ewe carries her young for five months.

There is a large meat-eating population in India, as, exclusive of Europeans, all Mahomedans and most Hindus are mutton-eaters; and when procurable, the Mahomedans, and the majority of Hindus, in large towns, will eat meat daily when in a position to do so; but to those resident in villages, it is a great luxury to have a meal of meat once a year, perhaps at the Pongul feast, or when some vow is made and a sheep is offered as a sacrifice to some one of their numerous deities. This frequently occurs at the Dussera, or ten days' festival. Again, many natives, even in towns where meat is procurable in the bazaars daily, will only use it once a week, fortnight, or month. Goat's

meat is more largely consumed than the flesh of sheep, and the majority of natives prefer quantity to quality, no matter how old and tough the animal: enough if it is of large size. Sheep-mutton is procurable in most towns at 2 annas the seer of ordinary, and 3 to 4 annas the seer of fat, mutton; the native seer being nearly equivalent to 1¾lbs. avoirdupois. The ordinary Indian sheep seldom exceeds 50lbs. in weight, and the mutton ranges from 20 to 30lbs. In most districts, a fairly fat sheep from the flock can be bought for 2 or 3 rupees; in the Madras sheep-market, at Perambore, any number of ordinary sheep can be purchased at prices varying from 1½ to 3 rupees; and fat sheep fit for the table from 7 to 10 rupees a piece. The average weight of a good well-fed wether should be 60 to 80lbs., when the mutton turned out ranges from 35 to 50lbs. I fear few animals at present turn out a larger proportion of mutton; but they can, if proper attention and feed be given to animals. Any one who may have observed sheep at pasture must have noticed a certain amount of restlessness in them, and that they strike their feet on the ground occasionally. The natives believe this to be caused by a worm in the foot; and under that impression they cut out the feet-pits, of which mention has been made above, from both fore feet, and they pompously parade the excised portion as the *poochee* or insect, without the extraction of which, the animal is not supposed to fatten well. This operation is only practised on pet-lambs, and I have not seen any evil result from the practice.

The best breed of sheep indigenous to the country are the woolly varieties, which, however, are open to great improvement. With care, due selection and attention to stock, the Patna, Coimbatore and Mysore breed of sheep can be got to produce both wool and mutton of a superior quality.

I have crossed the Madras ewes with the Merino ram and obtained some good lambs. The progeny showed

all the make of the carcase of a well-bred Merino: there was no wool; but a coarse mixture of wool and hair took its place. When I was leaving the Chingleput District, I sent my little flock of twenty-five animals to Palmanair to a friend, but before many months they disappeared. I was told that the majority died, and that the others were eaten. In breeding sheep great attention should be paid to the rams, as their influence is great, and their progeny, in a year, are very numerous. A well-cared-for ram will serve from sixty to eighty ewes and even a hundred, if he be not let loose among the flock to exhaust his energy. The ewes, when in season, should be held to him at his crib; and, in this way, he could be got to serve a much greater number of ewes without detriment either to himself or his progeny. It is a mistake to search for superior gimmers or ewes to breed from. As the flock increases in number, the deformed, barren, and otherwise mis-shaped ewes, should be weeded out, the best only being retained. The male lambs should be selected and separated from the flock, the best and most promising retained for breeding purposes, and the others converted into wethers and fattened off as they attain the age of about two years. It is a very simple matter to write down rules, but it is most difficult to carry them out in practice. The natives are so stubborn and obstinate in some of their notions, that it is difficult to get them at first to carry out orders without constant personal supervision; the master's eye should always be present, and he should look to everything himself. Few people in India ever take an interest in the improvement of the breed of sheep. All they care for is their mutton; and with that view they will get together a number of sheep of any breed and gram-feed them. In former years, before the present disorganization of native regiments took place, nearly every regiment supported a mutton-club; and frequently there was a station-club also in most districts

but those days are gone by, and a mutton-club now is a rarity.

The Indian sheep is not a bad animal to furnish mutton, and when it is crossed judiciously with either the Patna, Coimbatore or Mysore breed, some first-rate animals are turned out. I have recently seen crosses between the Nellore sheep and the woolly sheep in the Kistna District; between the Madras ram and the Mysore ewe in the Poonganoor Zemindary; and between the Madras ram and the Coimbatore ewe at Sunkerydroog in the Salem District. These animals were of good large size and form, and were covered with a shaggy coat of hair and had very good carcases; the only fault I had to find with them being that they were much too short in the body. By attention and due selection, improvements can be carried out in this direction also. Few people, however, care for such matters, and no permanent good can be effected by any single individual, especially as the stay of the few Europeans who take an interest in sheep-breeding, terminates in India with their service, and they are not pecuniarily interested in them. The day is distant, therefore, when intelligent and well-educated natives of the country will take an interest in sheep-breeding, and appreciate the advantage of high-farming and stock-feeding, growing special food, and maintaining good pasture-lands for their flocks and herds. This cannot be expected, I fear, when a good sheep from the flock can be had for 2 or 3 rupees, having cost the shepherd nothing beyond the care necessary to protect them from the ravages of wild beasts, and to prevent them from straying. Many of the country grains are exceedingly cheap, and, if cooked, would form first-rate food for fattening sheep. My own personal experience, in this respect, is limited to the *varagoo, Panicum, miliaceum,* Shamai *Panicum miliare* and *Panicum Italicum* or Tenney, and oil-cake either of the gingelly-seeds or ground-nut. Cooked food is

very nourishing, and the animals partake of it with great relish; and it is, moreover, very fattening. I believe that during the season these are the cheapest grains procurable in most districts, and, as regards green food, the *Aghati* is the best—*Aghati grandiflorum*—which is not only readily eaten by sheep, but possesses good fattening properties. Natives generally use the Aghati, Jack and Peepul leaves to feed their pet-sheep with. The Aghati can be readily grown. It is now largely grown as a shade-giving tree in every betel garden in India, and the leaves are sold in the bazaars as greens. Sheep, in their semi-wild state, when first brought from the fold, will not eat even cut-grass; but when tamed, the sheep becomes almost omnivorous and will eat all kinds of leaves, and hay, grain, oil-cake, &c. All our domestic animals require to be taught to eat food they have not been accustomed to, or they will starve to death.

I have long been interested in endeavors to improve the indigenous sheep of the country; and, with that view, I have personally examined the sheep of most districts in India. In my opinion, the Patna, Coimbatore and Mysore are the best breeds to improve. It is quite possible to improve both the mutton and wool of these animals; but, at the same time, it must be said that these sheep do not thrive in all districts. Under these circumstances they should be crossed with picked sheep of the Madras breed, among which some sturdy animals with good carcases are met with; and thus their mutton-forming qualities can be improved, while the value of the woolly breeds can also be improved both as regards their mutton and wool.

Sheep are delicate animals and suffer much from the heavy rains; and the north-east winds kill them readily if they are much exposed to them. They should be put under cover during the wet seasons; and during the hot dry weather, some green food should be expressly grown for them. Owing to the neglect they

experience, sheep suffer from a variety of diseases in this country. The native shepherd knows of no treatment, nor does he understand the isolation of the sick from the healthy. He sometimes resorts to charms and incantations and ceremonies to remove the "evil eye." His two most potent remedies are the hot or firing iron, and amputation of the ears. The hot iron is a panacea for most diseases; and, whilst admitting its efficacy in many diseases, yet, I think, the natives use it most unmercifully and unnecessarily. Amputation of a portion, or of the whole of the ear, is not a bad practice; but this remedy also is resorted to indiscriminately.[1]

SHEEP.

"The names given to sheep are as follow:—A new-born sheep is termed a *lamb* and retains the name until weaned from its mother and able to support itself. The generic name is altered according to the sex and state of the animal: when a female, it is a *ewe lamb*; when a male, a *tup lamb*, and this last is changed to *hogg lamb* when it undergoes emasculation. After a lamb has been weaned and until the first fleece is shorn from its back, it is called a *hogg*, which is also modified according to the sex and state of the animal; a female being a *ewe hogg*, male a *tup hogg*, and a castrated male a *wether hogg*. After the first fleece has been shorn, another change is made in the nomenclature, the ewe hogg then becomes a *gimmer*; the tup, a *shearling tup*; and the *wether hogg*, a *dinmont*, and these names are retained until the fleece is shorn the second time. After the second shearing, another change is effected in all the names, the gimmer is then a *ewe* if she is *in lamb*, but if not, a *barren gimmer*, and if never put to the ram, an *eild gimmer*. The shearling tup is then a 2-*shear tup*, and the dinmont is a *wether*, but more correctly a 2-*shear wether*.

1 Reprinted from the Revenue Register.

"A ewe three times shorn is a *twinter ewe* (two-winter ewe) a tup is a 3-*shear tup*, and a wether still a *wether*, or more correctly a 3-*shear wether*. A ewe four times shorn is a 3-*winter ewe* or *aged ewe*; a tup an *aged tup*, which name he retains ever after whatever his age, and the wether is now a *wether* properly so called.

"A ewe that has borne a lamb, when it fails to be with lamb again, is a *tup eill*, or barren ewe. After a ewe has ceased to give milk, she is a *yeld ewe*; when a ewe is removed from the breeding flock, it is a draft ewe, whatever her age may be; gimmers put aside as unfit for breeding are *draft gimmers*, and the lambs, dinmonts or wethers drafted out of the fat or young stock are *sheddings, tails*, or *drafts*."[1]

AGE.

The age of sheep may be estimated like cattle, by the growth of their permanent teeth. At birth there are the milk-teeth in the lower jaw, the upper jaw being bare; the mouth being completed by 8 temporary incisors. At two years of age the 2 central are replaced by permanent teeth, and at three years of age by 4, at 4 years of age by 6, and at 5 the whole 8 permanent teeth are completed. After the 6th year sheep begin to lose their teeth, when they are said to be "broken-mouthed." A sheep is supposed to be in its prime at 4 years of age, when its mutton is said to be "ripe."

SCAB.

This is a contagious loathsome eruption, and unless care be taken at once to remove the infected animal, the whole flock may soon become diseased, and even after the diseased animal has been removed, others may become affected from healthy animals rubbing themselves at posts, stones, trees, &c., &c., to which the diseased has had access.

---

[1] The Book of the Farm, by Henry Stephens, F.R.S.E.

Symptoms.—At first the animal evinces uneasiness and strays in an unconcerned manner from the fold, whilst the wool comes away in locks till the animal loses its fleece, either by its adhering to objects it rubs against, or in attempts to bite the part diseased, or to relieve the itchiness of the part by striking at it with the hind feet. Any object, a tree, stone, stake, wall or other prominent object it can find, it will rub itself against.

The parts shorn of wool will show pustules, and the skin will feel rough, and the pimples hard to the touch; when the pimples become broken, which may occur in 3 or 4 days by the animal rubbing itself, a fluid escapes from them which, as it dries, forms a scab which gives the designation to the disease. When this scab is rubbed off, an open sore is left which may increase and spread over other parts of the body, and when neglected, flies have access to the sores and breed maggots which eat into the flesh. It is now quite understood that the disease is caused by a parasite insect, a species of the *acari*.

Treatment.—This consists in endeavors to destroy the parasite. The animal should be well-washed with soap and water daily and have the sulphur ointment applied freely to the affected parts. One part of sulphur to two of sweet, or neem, oil makes an excellent ointment. An infusion of tobacco might also be tried. Half a pound of tobacco to four gallons of water well-boiled; and the infusion should be freely applied to the affected parts after they have been washed with soap and water, care should be taken to limit the use of the infusion of tobacco to a given part, for it may otherwise act as a poison, by absorption, and thus kill the animal. A spoonful of common salt should be given daily in the food.

DYSENTERY.

This disease is sometimes known by the names of flux, scourings or brasey, and is occasioned by con-

gestion and inflammation of the mucous membrane chiefly confined to the large intestine, producing not only an increased secretion but a morbid character in the fæces; and it is therefore a much more dangerous disease than diarrhœa.

Symptoms.—There is at first some constitutional disturbance and fever. The animal grows dull and uneasy, frequently lying down and rising up again; the breathing is hurried; the pulse quick and wiry; the mouth and nostrils become hot and dry; the eyes are slightly congested, more especially the lining membrane. The fæces are scanty and hard, or loose, mixed with blood and slime, and it soon becomes offensive. The stools become frequent, assume a putrid character and smell, and are discharged with pain, and the animal strains violently at each motion and death terminates its existence in a few days. Sometimes the disease may be the result of a previous attack of dysentery. It is a highly contagious disease and generally fatal.

Treatment.—Give at once two ounces of castor-oil with a drachm of laudanum, so as to clear out the bowels, and repeat again if necessary: should purging continue, take of

Chalk	1 ounce.
Catechu	½ do.
Ginger powder	2 drachms.
Laudanum	½ ounce.
Country arrack	a pint

mix well and give two ounces for a sheep, and one for a lamb, 3 times a day. Diet to consist of rice-gruel and bran-mash followed with fresh tender hay or green grass. The patient must be removed from the flock and kept at some distance from the others.

PURGING or DIARRHŒA.

Purging is sometimes occasioned during the wet or cold weather from the free eating of the fresh

shoots of grass that spring up after each shower of rain, and is simply a relaxed state of the mucous membrane of the bowels, producing liquid fæces. The disease being chiefly confined to the small intestines.

Symptoms.—There is much prostration of strength, with the motions natural but large and liquid; the stools are not fetid, but the symptoms are aggravated by flatulence, griping and colicky pains; the appetite continues fair.

Treatment.—The disease should be attended to at once, if not, it may pass on to dysentery. Give at first two ounces of castor-oil with a drachm of laudanum, to be followed up the next day with the following mixture :—

Chalk	1 ounce.
Catechu	½ do.
Ginger powder	2 drachms.
Laudanum	½ an ounce.
Water	1 pint

give one ounce to a sheep and half an ounce to a lamb, 3 times a day.

THE FLUKE or LIVER LEECH.

This parasite, scientifically recognized as the *Distoma hepaticum,* is a parasite that belongs to a genus of intestinal worms, of which there are many species, inhabiting the alimentary canal of birds, fishes and beasts. The best known and most important species is the *fluke,* which infest the liver of the sheep finding their way into the substance, gall bladder and ducts, some of which are very small, whilst others vary from 4 to 6 lines long, and a line in breadth, the body round, soft and depressed, possessing two distinct and isolated suckers, the anterior of which surrounds the mouth, the other between the middle and lower third of body. The flesh of animals infested with fluke decompose rapidly, is much darker-colored, and has a sodden appearance. Sheep infested with the fluke begin to

lose flesh gradually, grow listless, dull, and eventually die of the disease known as the *Rot* or *Sheep Rot*. The treatment should consist in isolating infected animals from the healthy and give to each animal daily from half to one ounce of common salt and a ¼ ounce of powdered black pepper, night and morning with their food, for some days after which a spoonful of turpentine might be substituted with advantage.

As a prophylactic measure all healthy sheep should have from a quarter to half an ounce of common salt given to them daily.

THE HUSK, HOOSE or THREAD-WORM.

This parasite, known to Scientists as the *Strongylus filaria*, infests the throat and lungs of lambs and calves, whilst a variety affects the eyes of cattle and other's different parts of animals. They vary from 2 to 3 inches in length, and are about a line in thickness. When attacked the animal loses flesh, eyes pale, loss of appetite and cough, with drooping of the head, and the nose resting on the ground; the wool becomes loose with diarrhœa, which soon terminates in the death of the animal. The disease prevails mostly in low, damp situations. The treatment consists in the free use of common salt and repeated fumigations with carbolic acid; if freely used, this will destroy the worms and restore the lambs at once to health.

THE ROT.

This is a most destructive disease; it occurs as an epidemic frequently during the hot weather in this country from deficient and improper food and pasture, causing the death of numbers of a flock in a short period.

Symptoms.—The animal is dull and listless with disinclination to move, and general debility. In some animals there is a muco-purulent discharge from the nostrils, and emaciation, eyes dull and glassy, conjunctiva congested, or tinged yellow. Bowels costive at first followed by violent purging terminating in fetid

mucus stools, occasionally tinged with blood. Tympanitis, loss of cud or rumination are the chief symptoms by which the disease shows itself; and it generally terminates fatally in from three to seven days reckoning from the appearance of the fatal swelling under the jaw, which is characteristic of the disease. There may be at the same time indications of general dropsy, with cough in attempts to relieve the impending suffocation occasioned by the swelling under the jaw and throat.

Treatment.—As soon as the disease is discovered, an aperient should be given; should there be no diarrhœa or dysentery present, two ounces of epsom salts and two drachms of ginger powder formed into a drench with 4 to 8 ounces of tepid water should be given; but, should either of these diseases be present, two ounces of castor-oil and two drachms of laudanum should be substituted for the salts and be repeated if necessary 6 or 8 hours after; at the same time two drachms of common salt should be administered night and morning either with the food of the patient or as a drench. If diarrhœa or dysentery continues, an ounce of powdered chalk, half an ounce of catechu, and two drachms of powdered ginger, made into a mixture with a pint of country arrack, should be given; one to two ounces should be given 3 times a day according to circumstances.

The diet should consist of rice-gruel and tender hay. The salt at first given twice a day should be continued for sometime after, once a day.

The patient as well as the flock should be removed from the locality in which the disease was contracted to a richer and more open pasture.

CATARRH or COLD

Is a very common complaint among sheep during the wet weather, owing to exposure to wet and cold, and from being over-driven hurriedly from place to

place for shelter. It is seen more especially among the woolly varieties soon after being sheared.

Symptoms.—There is a slight cough with a free discharge of mucus from the nostrils, and in severe cases the animal grows dull and becomes feverish. The disease arises from inflammation of the lining membrane of the air-passages. The mucous membrane becomes congested and may be followed by inflammation. This may last for a day or two, or continue for a week or fortnight if unattended to.

Treatment.—Rest and quiet is all that is necessary; in severe cases an aperient may do good. One to two ounces of epsom salts, with a drachm of ginger powder given as a drench, will do the needful, but when the disease is neglected, it may terminate in bronchitis.

BRONCHITIS.

This disease is the result of a neglected catarrh, or it may arise from the same cause as a cold.

Symptoms.—This is a much more dangerous disease than a cold, involving as it does the whole of the respiratory passages in an inflammatory process attended with much cough and a profuse discharge from the nostrils: there is a want of appetite, pulse is excited and the breathing hurried. Bowels costive generally.

Treatment.—Give an ounce of epsom salts, a drachm of nitre and another of ginger with a pint of gruel as a drench, and the same may be repeated the next day if necessary, and continued for a few days in small doses, provided it does not over-purge; attention being paid to nursing and shelter. Equal parts of mustard-oil and turpentine made into a liniment should be rubbed in freely down the throat and chest in severe cases.

INFLAMMATION OF THE LUNGS or PNEUMONIA.

This disease is caused by inflammation of the substance of the lungs: not only the substance but the

lining membrane and bronchial tubes may be involved in the disease at the same time, and it may be difficult to diagnose one form from the other.

Symptoms.—There is a general disturbance of the system attended with much fever, excited wiry pulse and hard breathing, much cough and some discharge from the nostrils, mouth hot, cessation of rumination, loathing of food, heaving of the flanks, grinding of the teeth, excessive thirst, constipation of the bowels and disinclination to motion and a staggering gait when roused, mouth open, tongue slightly protruded, dizziness, drooping of the head—the dizziness returns with greater force in the course of an hour and then drops down. If made to stand it begins to bite its legs, and foaming at the mouth tries to suck the sand or anything in its way. These symptoms last for 2 days, when the animal dies. An hour before death a mucus discharge from the mouth, nose and anus often occurs.

Treatment.—Give at once two ounces of epsom salts, one drachm of nitre and two drachms of ginger powder mixed into a drench in a pint of gruel; and as soon as the bowels have been acted on, give two drachms of epsom salts, one drachm of nitre and one drachm of laudanum with half a pint of rice-gruel three times a day. Rest the patient, nurse well and shelter. If the cough is violent, the wool should be cut close on the sides of the chest and the mustard-oil and turpentine rubbed in night and morning; or a seton may be applied to either side of the chest.

TETANUS.

Sheep are very prone to tetanus or locked-jaw, after injuries and wounds more especially. The disease consists of a violent irritation of the nervous system occasioning spasmodic and violent contractions of the muscles of the body, more especially those of the neck, jaw and back.

Symptoms.—The jaws at first become stiff, and the animal is unable to feed: this is soon followed by stiffness of the neck and muscles of the back, the legs become fixed and stretched out as the animal topples to the ground. The muscles feel hard and stiff. The pulse is either excited, or slow and labored. It is almost an invariable attendant on the operation of castration in this country. The disease may prove fatal in from 12 to 48 hours.

Treatment.—Much cannot be done, the animal must be made easy by placing him on a bed of straw in some quiet locality, and should the patient be able to swallow, two to four ounces of epsom salts with a pint of country arrack should be given as a drench and be repeated in the course of six or eight hours, and large quantities of tepid water should be thrown up the bowels by an enema syringe. Half an ounce of laudanum with 4 ounces of country arrack should be given every 3 hours, as long as the animal is able to swallow, or until the symptoms are ameliorated. Should the disease have followed the operation of castration, the scrotum should be examined, the wound opened, and any confined discharge let out, the parts should be freely washed with carbolic acid lotion and covered over with a large stramonium poultice made by boiling fresh stramonium leaves soft. The same plan should be followed if the disease has been occasioned by any other wound.

RABIES or HYDROPHOBIA.

This is a most fatal disease that sometimes makes its appearance in a flock of sheep. It is invariably produced by the bite of a rabid dog or jackal in this country. The period of incubation extends over an uncertain time, ranging from two weeks to six months.

Symptoms.—At a varying period after the infliction of the wound, the animal grows dull, loses its appetite, and teases its companions by crossing them or in

butting them furiously. The breathing becomes hurried with spasmodic twitchings of the muscles of the neck and throat; after a time the animal grows careless and drowsy: saliva flows freely from the mouth, there are sometimes evident symptoms of thirst, with an inability to swallow, the bowels become torpid and the patient dies in the course of a week if not before asphyxiated.

Treatment.—The best plan to adopt is to destroy the animal if rabid, at once, as yet no treatment has been of avail; but as soon as the animal is bitten, even by a dog and without symptoms of madness, the part should be cut out and freely washed with plenty of cold water and the pure sulphuric or nitric acid poured into the wound; or should there be suspicion that it has been bitten by a rabid dog, the animal should be destroyed at once.

THE GAD FLY,

Or the *Oestrus Ovis,* infest sheep and deposit their ova about the nose and lips, and the larvæ, as soon as hatched, scramble up the nostrils and find their way into the sinuses, where they remain till the following year, feeding on the mucus of the lining membrane to which they attach themselves by means of the hooks by which the mouth is provided. While the larvæ are in search of a suitable place, they may cause some annoyance to the sheep, as the animals manifest great restlessness and do not feed well; but the larvæ, having settled in a place once as their residence, they remain stationary and do not cause any irritation unless they are in large numbers.

Generally a few worms only are found infesting the nasal cavities of a few of the flock. The injury, if any, is caused during the entrance and exit of the larvæ from the nostrils of the sheep, causing sneezing and restlessness; they produce no serious results, but it is generally believed that they cause irritation and inflammation of the brain; this is only a supposition.

Numbers of sheep harbour the worms, and do not exhibit any symptoms of suffering, nor is their health in any way disturbed.

Treatment.—Treatment not necessary, either medical or surgical. Empyric treatment will cause more mischief than the disease it is intended to cure. It is in the first place impossible to detect the infested animals, and if detected, the exact locality in which the worms are located cannot be determined.

Note.—A species of the Gad Fly, known as the *Oestrus bovis*, attacks cattle. The female deposits her eggs on the back and sides of cows and oxen, and the larvæ thus produced enter the hide causing tumours the size of a pigeon's egg. This fly produces more annoyance than others, and the act of depositing the eggs causes severe suffering, or great apprehension, so that the cattle when attacked becomes furious. Fear and trembling attacks the whole herd and the animals attacked flee from the rest, bellowing and take refuge in the nearest sheet of water, whilst the herd will with affright follow in their rear with headlong speed.

FLIES.

The *Muscidoe*, or Fly family, belong to the order *Diptera*, and are great pests containing those insects familiarly known as flies, of which the House Fly may be taken as the type. These insects show themselves in large numbers during the hot weather generally, and become exceedingly troublesome to man and animals. They worry animals greatly, attacking any part that may have a small abrasion or sore, and immediately deposit eggs at the part or in its immediate vicinity where they are hatched, and the larvæ, familiarly known as maggots, infest the part and eat into it, forming large deep sores, and causing not only destruction of the part, but suffering to the animal. Of these flies the following are the most destructive and troublesome, and their eggs are known as "fly blows" :—

1. The Blow Fly, or *Musea Carinaria.*
2. The Blue Bottle Fly, or *Musea Vomitoria.*
3. The Flesh Fly, or *Musea Cœsar.*

Treatment.—This consists in great attention to cleanliness, and during the time the flies abound smearing the coat of the animal daily with carbolic or kerosine oil, and if maggots have formed in any part the carbolic oil freely applied to the part two or three times a day, will destroy them at once, and allow of the sore being healed.

PARTURITION.

Parturition in the ewe is a natural process, and as the time approaches, it may be readily ascertained by the enlargement and reddening of the parts under the tail, drooping of the flanks, striking of the earth with the feet, restlessness, moving off from one part of the field or fold to another away from companions: frequent lying down and getting up also takes place: a short time after which the membranes, or bag of waters, may be seen to protrude from the vagina; and this is followed by labor pains. The ewe now lies down and stretches herself out on her side, and the fore feet of the young closely applied to the mouth are seen protruding through the vagina. They are soon followed by the body.

On the birth of the lamb, the ewe turns her head round to look at it and is soon after upon her legs licking the lamb fondly; but young ewes may be shy or startled at first and go away from the lamb to some distance and then turn round and look at the lamb and run back bleating to it.

The new-born lamb soon totters on to its feet trembling and it begins immediately to search for the teats. The after-birth comes away within a few minutes in an hour or two at best; it should be removed from the place. In the woolly varieties it may be advisable to trim the wool about the udder and flanks, and such lambs as do not succeed in finding the teats should be assisted. The period of lambing in this country varies slightly in the different districts. It extends from

October to January. Some few drop their lambs earlier or later. In the Bellary District the lambing commences in October, and in South Arcot in November. The ewe carries her young for 5 months or 153 days. In all flocks the pregnant ewes should be separated from the others and kept by themselves, and where large numbers are expected to lamb, much confusion may be occasioned unless the shepherd is intelligent and practical, or has one or more assistants to help him.

Several ewes may drop their young about the same time and create confusion by the lambs getting mixed up, but every ewe will recognize her own lamb instinctively if allowed to smell them. Young ewes will sometimes desert their young, and ewes out of condition will also neglect their lambs; these will require attention or there may be a large mortality of lambs from want and neglect. Some ewes that have deserted their lambs at first, may go about bleating, whilst others will require assistance. The lambs in every case of neglect must be taken to the dam as soon as she can be traced, and the ewe held and the lamb allowed to suck; this may have to be done for the first day or two until the lambs are strong enough to follow the ewe and find their own nourishment from her. When ewes have no milk, their lambs will have to be put to others that may have milk to spare, or they will have to be fed by the hand with cow milk; but I have found it a capital plan to keep a few milch goats to act as wet nurses to the deserted lambs as practised in Mysore.

GOATS.

The Goat family, a sub-tribe of animals belonging to the class *Mammalia*, order *Ungulata*, family *Bovidæ*, are characterized by having the horns sub-angular, recurved, compressed, seated on the crest of the forehead, and, by their union, covering the top of the head. The males are generally bearded and have a strong stench. They butt with their heads, first raising themselves upon their hind legs and then coming sideways against their enemies. The common goat, *Hircus Œgagrus*, may be taken as the type of the family. This animal is found as a native of every part of the old world. It is a lively, sportive, wanton creature, impatient of confinement, fond of solitude and of climbing lofty, rugged eminences. It is eminently curious, capricious and confident, and is a very useful animal, supplying food and raiment to no inconsiderable degree (Baird). Of goats there are several varieties, the chief of which are the long and short-legged race. The value of a good breeding Nanny of the long-legged variety is from Rs. 3 to 7. Selected animals, as milch goats, will bring Rs. 7 to 10 each and will produce 3 kids in 2 years. Kids if sold for the table, when 6 weeks or 2 months old will bring from 8 to 12 annas. Billy-goats fetch from Rs. 2 to 5 when 3 or 4 years old; if castrated Rs. 5 to 7. Milch goats will yield at an average 2 to 4 ollocks of milk in the 24 hours, its value 2 annas. An ordinary goat, male or female, fetches Rs. 2 or 3. Fresh goat-skins bring Rs. 1-4-0 to Rs. 1-8-0 each, and tanned skins Rs. 2 to Rs. 2-8-0. A large export trade in skins is now being established with America, and the demand is likely to increase. Short-legged goats will bring Rs. 3 to 10 if good milkers and will produce 2 to 6 young in the 12 months. The young, sold as kids, will realize 8 to 12 annas, and the

goat will yield 2 to 6 ollocks of milk when well fed and tended; value of milk 3 annas. In the disposal of the kids, the males should be sold and the females kept for breeding-purposes. When kids are intended for the table, the goats should not be milked. When the kids are sold, the yield of milk will be greater in each variety. The blood and offal make first-class manure. Each animal will produce 2 annas worth of manure when kept for the month. The night manure is always at command, and a portion of the produce of the day may be collected by children picking up their droppings, as is done on coffee estates with cattle. Goat's hair has been used for textile fabrics, and in the Punjab the hair is used for making ropes, mats, bags to contain grain, and rugs. When not thus used they add to the value of manure with the horns, hoofs and bones. Goat-skins, when tanned, are chiefly used for book-binding, manufacture of gloves, parchment, chamois leather, and other useful purposes. Goats of both varieties feed chiefly on leaves, and, for cheapness of keep, a jungly or hilly country is the best suited for them when kept in large flocks. A stall-fed goat in 2 or 3 months will weigh, live weight, 80 to 100 pounds, and free of offals, &c., will yield from 40 to 50lbs of mutton which, at 2 annas a pound, will produce Rs. 5 for the mutton alone. Goat's flesh furnishes good nourishing food, which is largely consumed by meat-eating natives, and is often laid on European tables without the difference between it and sheep's mutton being recognized. The flesh of kids is excellent eating and is greatly esteemed. The milk is rich, sweet, nourishing and medicinal, and is considered superior to cow's milk. The natives attach medicinal virtues to goat's milk, because these animals feed on all sorts of leaves. Even poisons are harmless to them. A milch goat is a most useful animal, and one or two can always be conveniently reared where a cow or pony is kept. The Mahomedans are extremely partial to goats

and always manage to keep a few when they can. Goats begin to breed when 5 to 6 months old, and continue to do so for 10 or more years. They carry their young 5 months. Their breeding season can be arranged by keeping the males separate, and allowing them access to the females at certain times, so as to allow of their young being dropped at fair seasons when food is abundant.

There are in all about 25 varieties of goats that have been domesticated, and there still exists some 2 or 3 wild varieties. Of the latter the Murkhur, or snake-eater of the Afghans, and the Himalayan and Neilgherry wild goats may be taken as examples, and they interbreed freely with the common goat though the produce is not always fertile. Hybrids between the goat and sheep have occurred but rarely. A goat continues productive for about 12 years and lives from 12 to 18 years.

Of the domesticated varieties, the most valuable are the Angora, Cashmere and Syrian goats, which are famed for their wool or hair-producing qualities. The Angora goat comes from a city of that name in Asiatic Turkey, and furnishes wool. The Cashmerean goat is misnamed, as the province of Cashmere is too warm and damp for these animals, and the best wool-producers are natives of Thibetian Himalaya Garoo, Mansurawu and the elevated lands eastward; they are also known as the shawl goats of Nepaul and Thibet, famed for the fine quantity of wool that they produce. The soft-curled down wool grows next the skin and is covered and protected by the long shaggy hair; from this wool the famous shawls of Cashmere and the finest camlets are made.

Another well-known animal in the East is the Syrian goat, which is covered with long, black shaggy hair, from which a species of cloth, commonly used by the Arabs for covering their tents, is manufactured. Hybrids of this variety of the goat are known as the

Aden goat, and these are imported by Arab traders, and passed off under the name of Angora or Cashmerean goats. These goats have long flapping pendant ears and slender limbs. The Angora, Cashmere and Syrian goats are mostly small animals, much resembling the short-legged, or Nanny-goats. Other varieties, known as the Nepaul goats, have long flapping ears and rounded or Roman noses, whilst others have hollow or saddle backs.

The most suitable animals for introduction into India, on account of their wool or hair, would be the Angora and Syrian goats; the so-called Cashmerean goats will not thrive in these parts, as their natural home is at an elevation of 6 to 7,000 feet above sea level, and even should they survive this climate their fine wool would rapidly degenerate into hair![1] The names given to goats are limited to a few and are as follows: the young is termed a kid, the generic name is altered according to the sex of the animal into female kid or male kid; when they begin to breed the females are termed "Nanny-goat" and the males "Billy-goat," and a castrated male is termed a "Wether-goat." Goats are delicate animals and require housing at night, more particularly in inclement weather in most districts as they are liable to suffer from the heavy rains at the opening of the monsoons, and the north-east winds tell severely on them, often killing them off in large numbers. They suffer like sheep from similar diseases, and the same potential remedy, the hot iron and amputation of the ears, is the goat-herd's panacea for all diseases. The same remedies prescribed for sheep are applied to goats when suffering from similar diseases. Notwithstanding the utility of the goat, it is the enemy of the Horticulturist, Agriculturist and Forester; if it once enters a cultivated plot, be it a garden, field or reserved forest, entire

---

[1] Reprinted from the Guide to the Eurasian and Anglo-Indian villages,

destruction follows its track, and many plants rarely recover from its bite, that it is necessary that they should be carefully tended and be kept away from all cultivated places, so that their utility may not be lost by the destruction they create. Goats have not received the attention they need in Europe; that steps have been taken to form a British Goat Society, for their protection and to extend their utility, will be seen from the following:—

"At a meeting, on the 9th instant, of members of the British Goat Society, a paper was read by Dr. R. J. Lee, F.R.C.P., (one of the Physicians to the Children's Hospital), on 'Goats' Milk, and its utility as a food for infants and invalids.' Dr. Lee was quite certain that if a hundred children were fed on goats' milk and compared with an equal number of corresponding ages, all circumstances being similar, who were fed on any milk except that of their mothers, the former would have the advantage. He said the peculiarity about this milk is that the cream globules are smaller than in cows' milk; and the milk being more concentrated, the cream globules are contained in a more perfect state of emulsion, in consequence of which hardly any cream rises to the surface in allowing the milk to stand for twelve hours or longer. With regard to the use of goats' milk for medicinal purposes, there was every reason in favor of making an extensive trial of it. He trusted that before long it would be possible to collect a number of reliable results, which would prove that the efforts of the Society had been of real practical value to those who most deserve sympathy and tender care, the sick and the young."

Mr. Rice, in his Manual of Mysore, gives the following brief account of the goats of that Province:—

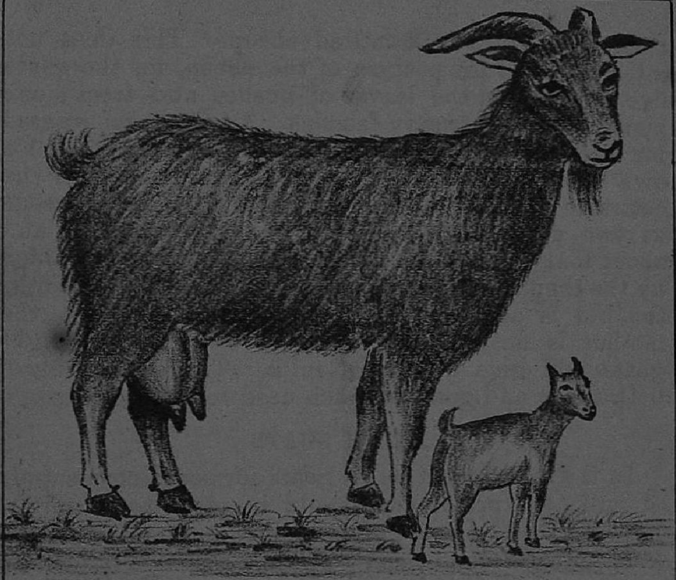
Goats.—There are two kinds of goats, the long-legged or Meke, and the short-legged or Kanchi Meke, but the two can propagate together. In every flock of sheep there is commonly a proportion of ten or

twenty Meke to a hundred sheep. This does not interfere with the pasture of the sheep, for the goats live entirely on the leaves of bushes and trees; one male is kept for twenty females. Of those not wanted for breeding, the shepherd sacrifices some for his own use while they are young; the remainder he castrates and sells to the butcher. The female breeds at two years of age; they breed once a year and about four times, after which they are generally killed by the shepherds for their own use. For three months the kid is allowed the whole milk; afterwards the mother is milked once a day for two months; eight goats will give a quart of milk. The excrement of both sheep and goats is much used for manure.

MILCH GOATS.

In the selection of milch goats for securing a supply of milk, the preference should be given to an animal between 3 and 4 years of age, and one that had yeaned kids for the second time. The age of goats like sheep may be ascertained by looking at the mouth and examining the teeth.

The mouth of a goat at one year contains its full compliment of 32 teeth, namely, 6 molars on either side of each jaw, and 8 incisors or front teeth in the lower jaw only. During the second year the two central incisors are replaced by permanent ones which are larger and stronger than the milk teeth, from which they can be readily recognised. In the third there are 4, and in the fourth, 6, at the fifth year the 8 permanent teeth are completed and the mouth is said to be "full;" so that by the aid of the dentition of the animal, its age can be ascertained pretty correctly up to 6 years, after that it is simply a matter of guess-work, but by taking the wear and tear of the teeth and the general appearance of the animal, its age can be approximately fixed; but after 8 years it begins to suffer not only in being worn down, but the



MILCH GOAT WITH A RESERVED KID.

AN AFGHAN BILLY GOAT.

From a Photograph.

G. Packzensky, Lithog. For Higginbotham & Co., Madras.

teeth get broken or drop out, when the animal is pronounced "broken-mouthed." The milch goat should be good-tempered, well-formed, with short horns, a long, deep body, sturdy-looking and wide about the haunches, with a large, soft and elastic udder, and the teats firm and standing out. Hornless goats often prove the best milkers.

Nanny, or the short-legged goats, are the best; they generally produce from 2 to 4 kids at a birth, and occasionally 5 to 6 kids have been produced at a birth; for the purpose of securing a due supply of milk, the kids should be got rid of as speedily as possible, with perhaps the exception of one female kid, when she will yield a good supply of milk two or three times a day. An ordinary goat will yield a pint, and a superior animal from two to four pints of milk in the twenty-four hours; the oftener the udder is emptied the quicker it is replenished, provided feeding and milking are carried on simultaneously. Goats like cows should have their food whilst they are being milked as a general rule. When without kids they form good travellers and will follow a cart if the distances are not too great, and will add to the comforts of a camp-life by a free yield of milk; whilst at home she will prove a good nurse for a weakly or sickly baby.

APPENDIX.

The following interesting particulars with regard to experiments on milk, the value of cattle food and work, and the breed and management of the Sydapett flock of sheep has been abstracted from the Annual Report of the Superintendent of Government Farms for the years 1872 and 1874:—

"An old cow purchased for 60 rupees. At the time of purchase she had a calf one month old; she was much out of condition. Her food daily was 4 pounds of ground-nut cake, 2 pounds of wheat bran, 20lbs. of green fodder, (cholum, &c.) 15lbs. of grass, $\frac{3}{4}$oz. of salt. She is allowed to graze in the compound each morning, after being milked, for about couple of hours: during the remainder of the day and during night she is tied in a byre and is always supplied abundantly with drinking water. She is milked at about 7 in the morning and about 5 in the evening. She eats her cake (steeped) and bran while she is being milked, and her calf is allowed to lie near her at the time, being permitted to strip any milk left; after this is done, the calf is not allowed to go near its dam until the milking hour again comes round. The average quantity of milk yielded during 12 weeks was

Daily.................................. $10\frac{85}{112}$ pints.
Weekly.................................. $75\frac{5}{16}$ do.

whilst the yield of milk was increased, so was the

weight of the cow; when purchased about four months ago, she weighed only 536 pounds; at the end of the experiment, 679 pounds." In a second experiment:

"The milk was produced by a cow, a cross between a Devon bull and a Nellore cow. The registration began from the third day after the cow calved, (her third calf), and extended over a period of six months. During the whole of this time the daily food of the cow consisted of green fodder, 40lbs.; ground-nut cake, 4lbs.; and wheat bran, 2lbs., and about a dessert spoonful of salt; the ground-nut cake was steeped and mixed with the bran, half being given in the morning and half in the evening; the cow was kept tied in the byre except for about 2 hours daily, when she was let out for exercise and to be washed; she was milked at about 7 in the morning and at 5 in the evening. Whilst the cow was being milked, the calf was always tied near her in the usual way, and was allowed to strip the udder, a sufficiency of milk being left for the wants of the calf. The following are from the registrations:—

"The average yield of milk	daily	was	$14\frac{47}{168}$	pints.
Do.	do.	weekly	$99\frac{23}{24}$	do.
Do.	do.	monthly	$399\frac{5}{6}$	do.

"The total quantity of milk yielded during the six months was 799 measures and 6 ollocks, or 2,399 imperial pints.

"In these records a measure is calculated to be equal to three imperial pints; fractions of a pint are omitted unless over a half which is calculated as one pint; the exact contents of a standard measure is 104 cubic inches while an imperial pint contains 34·659 cubic inches.

"The following statement exhibits the quantity of milk yielded by the cow in each of the months over which the experiment extended :—

	Meas.	Olks.	Pints.		Meas.	Olks.	Pints.
1st Week.	46	0	138	13th Week.	33	2	100
2nd do.	44	5	134	14th do.	32	1	96
3rd do.	41	7	126	15th do.	30	5½	92
4th do.	42	3½	127	16th do.	30	4	92
Yield in 1st Month.	174	7½	525	Yield in 4th Month.	126	4½	380
5th Week.	45	0	135	17th Week.	31	½	93
6th do.	40	1	120	18th do.	30	7	93
7th do.	30	3½	91	19th do.	31	4½	95
8th do.	31	3	94	20th do.	29	6¼	89
Yield in 2nd Month.	146	7½	440	Yield in 5th Month.	123	2½	370
9th Week.	31	3½	94	21st Week.	28	4	86
10th do.	30	3	91	22nd do.	27	3	82
11th do.	30	½	90	23rd do.	26	0	78
12th do.	28	3	85	24th do.	25	7	78
Yield in 3rd Month.	120	2	360	Yield in 6th Month.	107	6	324

"The prices paid for the food, &c., of the cow during the experiment were as follows :—ground-nut cake, 65lbs. per rupee; bran, 32lbs. per rupee; green fodder, 300lbs. per rupee; straw for bedding, salt, &c., 1 rupee per month, and attendance Rupees 3 per month, (the man having other duties to perform). The total cost incurred during the six months was

	RS.	A.	P.
168 days green fodder, at 40lbs. daily.	22	6	5
168 ,, ground-nut cake, at 4lbs. ,,	10	5	5
168 ,, bran, at 2lbs. ,,	10	8	0
Straw and salt..............................	6	0	0
Attendance	18	0	0
Total...	67	3	10

"If from this amount we deduct Rs. 15, the value of the calf at six months old, there remains Rs. 52-3-10 as the cost of the 799 measures and ollocks of milk or, say in round numbers, 800 measures for Rs. 52 equal to one anna per measure; it should, however, be remembered that the yield of milk will gradually continue to diminish until the cow again calves, and, as the cost of maintaining the cow up to that period will not be less than when in full milk, the cost of the milk will be proportionally increased, but throughout the year the milk will not cost 2 annas per measure. As in the larger towns of Southern India, milk of very inferior quality sells readily for 3 annas per measure; it will be seen that in dairying a very profitable business could be established, and one well worthy of the attention of the "Poor Whites" of this country, regarding whom of late we have heard so much. But a dairy to be successful must command the confidence of the public.

"It will be observed that the Return for the 7th week is 25 per cent. less than the yield of the previous week; this sudden diminution was due to the cow having been milked by a person to whom she was unaccustomed, the man who always milked her being absent from sickness; this change proved very unfortunate, for though when the regular milker returned to his duties in the 13th week, the yield somewhat improved, it was still very much below what it would have been had the change referred to not occurred. I think it necessary to call particular attention to the facts just stated, for, though some cows will give the same quantity of milk to any milker, it is well that it should be known that with some cows a change in their attendant may lead to a very large reduction in the quantity of milk obtained.

"During the first four months of the experiment, the calf was allowed to take daily about one measure of milk and about half a measure daily during the other two months ; this milk was of course not brought to account in the foregoing registrations ; I think it an advantage in this country to allow the calf access to its mother before and after milking, as is customary in this part of India ; not only does the cow yield her milk more freely, but what is of more importance, her udder is thoroughly stripped after each milking ; and, with the help of other food, the calf can be reared at a very moderate cost. The first calf of the cow referred to was reared in this manner until about a year old, when it was fed on food similar to that given to its mother ; it was always in good condition, and will calve at three years old, fully a year earlier than it is usual for heifers to calve in this country.

"I attach very great importance to this experiment made in this country excepting that detailed in my Report for 1872 ; and, before we can attempt to do anything to improve the dairy stock of the country which so greatly needs attention, we must have reliable data for the guidance of our efforts."

MEMO. OF CATTLE FOOD AND WORK.

It is stated with reference to oil-cake that 4lbs., with a full supply of fodder, suffice for working cattle and keeps them in good condition, and that the ground-nut cake is equal to horse-gram weight for weight, and that it is equally nutritious and can be purchased at most seasons at half the price of gram.

Cattle work daily at the Government Farm for 9 hours in the cold, and 8½ hours in the hot season.

Carts are loaded from 1,000 to 1,200lbs., and are drawn at the speed of 2 miles an hour.

The following table shows the daily ration of food issued to the stock at the Government Farm, Sydapett, for the year 1883-84 :—

——	Working Cattle.	Cows.	Young Bulls.	Calves.	Young Calves.
	lb.	lb.	lb.	lb.	lb.
Ground-nut cake ...	4	4	3	1	½
Bran	...	1	...	1	1
Dholl husk	2	2	2	1	...
	oz.	oz.	oz.	oz.	oz.
Salt	2	1½	1	1	¼
	lb.	lb.	lb.	lb.	lb.
Green fodder... ...	15	40	30	20	5
Dry fodder	30	...	...	...	...

SHEEP.

"Sheep-breeding experiments commenced at this Farm in 1869, with a selection from a flock consisting of Mysore, Coimbatore, Patna, Nellore and Madras breeds which have for 2 or 3 years been intermingled; from the cross thus formed, a breed with definite characteristics has been created, which Mr. Robertson, the Superintendent of Government Farms, has named the 'Sydapett breed.'

"The following details regarding the management of the Sydapett flock will supply the information for which I am frequently asked. All rams are kept entirely separate from the ewes; after being weaned, the ram lambs are reared in pens and are only occasionally allowed to graze; their food consists of green

fodder and ground-nut cake. I should much prefer that these sheep should be grazed more frequently instead of their being so much confined in pens, but it is extremely difficult to keep the rams apart from the ewes when both flocks are grazing. However, I intend forming a grass paddock wherein the rams can be secured and in which they can obtain food and regular exercise during certain hours of each day. The rams are not used until they are about two and a half years old, at which age a good specimen will weigh from 100 to 120lbs. live weight. The ewe flock is generally sorted over once a year, and those of a bad form or color or with inferior wool, as well as those that have lost some of their teeth, are taken out of the flock and put aside for fattening. In September the ewes that remain in the flock are, with a number of gimmers then about eighteen months old, put to the ram; about forty ewes are placed with one ram, the breast of which is colored to mark the ewes in a way that enables the shepherd to detect readily those ewes that have been served, which he removes from the flock. The lambs are born about five months after, generally about 90 per cent. of the ewes proving in lamb. The ewes when about to lamb are placed in pens three or four in each, where they are kept until their lambs are about three weeks old, after which they are again put into the flock in the sheepfold. All males that do not promise to turn out well are, when about six weeks old, made into wethers. When about three months old the lambs are removed from their mothers and are weaned, about a fortnight's separation sufficing for this, after which the wether and gimmer lambs are grazed in the flock with the ewes, the ram lambs being placed by themselves as previously noticed. All the sheep are generally clipped in April, which, I find, is the best month in the year for the purpose; when the ewes are being clipped, it is usual to mark the lambs in a way to render their identification easy; in the Farm flock

this is done by cutting a small hole by means of an ear-pincer in the cartilage of one ear of each. During the season of the year when night dews are heavy, the sheep do not leave the fold in the morning until the sun has removed the greatest part of the dew; it was found when the sheep were turned out too early in the morning to feed upon grass heavily covered by dew, that a number of them were invariably attacked by dysentery of a severe type. During the hottest part of the day, the sheep return to the fold for a few hours, and again go to graze until about 5 in the evening, when they again return and receive about half a pound of ground-nut cake per head, and are shut up in the fold for the night. During very dry weather they receive, in addition to the cake, a small quantity of green food, but they are maintained chiefly by the food they gather when out grazing. The sheep thus fed are kept in a thriving condition; they are, of course, not fit for the butcher, but they are generally in the condition that it is most desirable for breeding stock to be. I have tried various months in the year in which to put the ewes with the ram, under the impression that lambs born in December would thrive best from the abundant grass at that season available. I put the ewes with the ram in July, but the result of the experiment was disastrous, as a very large proportion of the lambs died, evidently, I think, from their mothers' milk being unfitted for them, the result of the too liberal consumption of immature hastily-grown grass. Next year the lambing season was postponed a fortnight, and the result was fewer deaths among the lambs. From this time the lambing season was each year made later until it fell in the middle of February, at which time of year it was found that fewest deaths occurred amongst the lambs, the death-rate having sunk from at the least twenty per cent., down to at the outside five per cent. This experience may be useful to owners of flocks; it

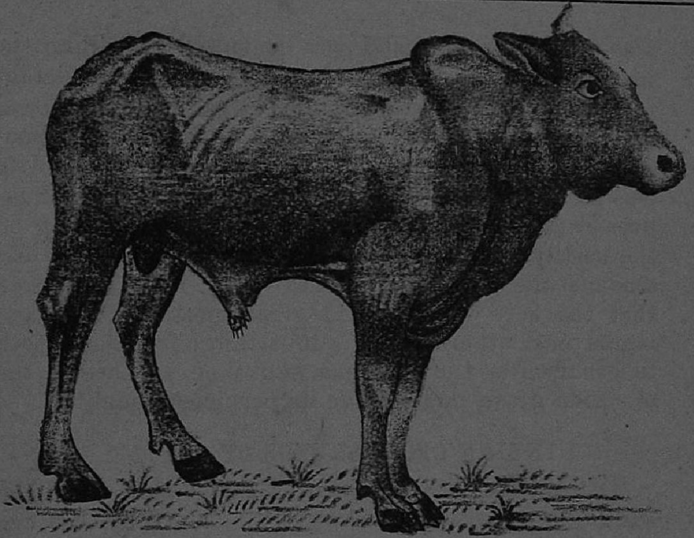
was only recently that I was consulted regarding the management of a flock, the lambs of which every lambing season died in great numbers; on enquiry, I was informed that each year's lambs generally fell about a month after the close of the monsoon rains, and to this fact I attributed the greatest mortality. Whenever ewes are suckling their lambs, and are feeding on the hastily-grown grass produced by the monsoon, loss amongst the lambs will be inevitable; I am convinced that the only way to avoid great mortality amongst lambs in Southern India is to arrange for their birth to occur after the sun has had time to harden the monsoon grass, and remove its pernicious qualities."

INDIAN CROSS-BREEDS OF CATTLE.

Between the *Bos taurus* or English cattle, and the *Bos Indicus* (Zebu) or Indian cattle, a cross-breed has been obtained, but these have not been continued by successive breeding, but are isolated instances which soon disappear from the want of attention to the subject. The English bull has been put to the Indian cow, and the Indian bull to the English cow, the progeny being a cross between the two, and some fine animals have thus been obtained, more especially when crossed by the Nellore breed of cattle, which in their form and appearance take mostly after the English breeds. The cross-bred cows are mostly appreciated, as they become good milkers, and yield large quantities of milk. The experiments noted elsewhere, as conducted at the Government Farm, were from one of these half-bred animals. Whilst the cows are appreciated, the bulls are not thought much of, as the natives think from their short necks and straight backs, they are not so well adapted to receive the yoke of the cart or plough and consequently do not make good draught animals. This is simply from prejudice as I have seen them at the plough and in the cart working as well as any other bullocks. I subjoin two

To face page 156

PLATE 19.

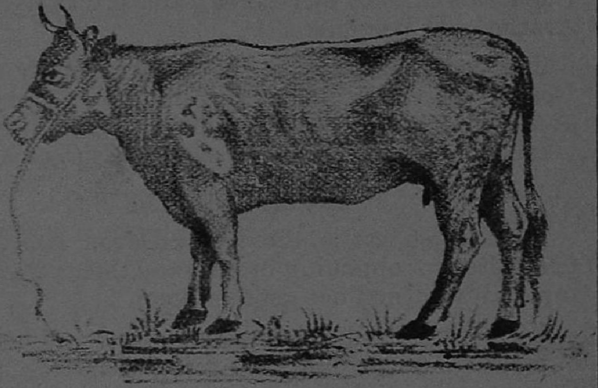


MR. SAMUEL ARATHOON'S BULL.

MR. ALFRED ARATHOON'S COW—"BEAUTY."

G. Pachrensky, Lithog

For Higginbotham & Co., Madras.



DEVON PRIZE COW—"DAIRYMAID."

Imported by W. H. Oakes of Madras.

DEVON PRIZE BULL—"BRITTON."

Imported by W. H. Oakes of Madras.

G. Packzensky, Lithog.

For Higginbotham & Co., Madras.

illustrations of this cross-breed. The half-bred bull 'Bully' 3 years old is out of a first-class Nellore cow and an imported English bull, (he was out of condition when this Photo. was taken,) the property of Mr. S. Arathoon of Bangalore.

The cow "Beauty" is the progeny of an imported Devon bull and a first-class Nellore cow; she is now about 8 years old, and has had her fourth calf. She is the property of Alfred Arathoon, Esq., of Madras.

ENGLISH CATTLE.

Of English cattle, the North Devon Bulls are the favourites for obtaining crosses and their progeny have invariably turned out good milkers.

I submit two illustrations taken from Photographs of a Bull and Cow imported a few years ago by W. H. Oakes, Esq., of Madras. Superior animals like these are occasionally imported, but from the want of continuous attention they either die off when they change owners, or both the animals themselves and their progeny are neglected and get lost. A large number of cross-breeds are now to be met with both at Madras and even at out-stations, and invariably, as far as my personal knowledge extends, they have proved to be good milkers.

English and Vernacular Names of Cattle Diseases.

Anthrax Fever	Pilavy-caichal. பிளவைகாய்ச்சல்.
Apoplexy	Mundy-adyppan. மண்டை அடைப்பான்.
Bronchitis	Kasum. காசம்.
Catarrh	Mookoo-adyppan. மூக்கு அடைப்பான்.
Calculi.........................	Kulladyppoo. கல்லடைப்பு.
Choking.......................	Moochadyppoo. மூச்சடைப்பு.
Colic	Vaéttoo-valee. வயிற்றுவலி.
Constipation	Mala-buntham. மலபந்தம்.
Cattle poisoning............	Maroontheedoo. மருந்திடு.
Diarrhœa......................	Kalichal. கழிச்சல்.
Dysentery	Erutha-kalichal. இரத்த கழிச்சல்.
Dropsy	Makōthirum. மகோதிரம்.
Distension of the Rumen .	Eryppy-veekum. இரப்பை வீக்கம்.
Fever	Caichal. காய்ச்சல்.
Fardel Bound...............	Sithamy - kudal - munthakuttoo. சிதமை குடல் மந்தக்கட்டு.
Foot and Mouth Disease or Epizootic Aphthæ.	Kal-vay-komaree. கால்வாய் கோமாரி.[1]
Hydrophobia................	Jalabaya-rogum. ஜலபய ரோகம்.
Hove, Tympanitis, or Blown.	Vayaroobbasum. வயருப்பசம்.

[1] *Baijijarah*, Canarese. *Munhpaon*, *Kalajarah*, Hind.

Hamaturia or Bloody Urine.	Erutha-Moothirum. இரத்த மூத்திரம்.
Hydatids.	Kudal-ppoosee. குடல்ப்புசி.
Inflammatory Fever......	Ari-caichal. எரி காய்ச்சல்.
Inflammation of the Brain	Kabala-sooly. கபாலசூலை.
Do. Heart...	Erutha-kalasa-arichal. இரத்தகலச எரிச்சல்.
Do. Bowels.	Kudal-arichal. குடல் எரிச்சல்.
Do. Liver...	Eral - arichal, ullathoo soola-novoo. ஈரல் எரிச்சல், அல்லது சூல நோவு.
Do. Lungs*.	Nench-adyppan. நெஞ்சடைப்பான்.
Do. Kidneys	Coondikai-arichal. குண்டிக்காய் எரிச்சல்.
Jaundice.....................	Munja-kamaly. மஞ்சகாமாலை.
Loss of Cud..................	Asypodamy. அசைபோடாமை.
Paralysis.....................	Parisa-vaivoo. பாரிச வாய்வு.
Malignant Sore Throat...	Thondy-adyppan. தொண்டை அடைப்பான்.
Rinderpest†	Visha-soorum. விஷ சுரம்.
Rheumatism	Odoo-vaivoo. ஓடு வாய்வு.
Splenic Apoplexy	Munneeralil - eruthama-dyppan. மண்ணீரலில் இரத்தமடைப்பான்.
Tetanus or Lock-jaw......	Kodira-junny. கொடிரஜன்னி.
Ophthalmia	Kunnoi. கண்ணோய்.
Diseases of the Feet......	Kal-noical. கால் நோய்கள்.
Sprains	Soolooccoo. சுளுக்கு.
Dislocation	Moottoo-peyurvoo. மூட்டு பெயர்வு.

* *Phephre Ka Marz*, Hind.

† Synonymous with *Periah novu*, *Pytchi novu*, *Kudi novu*, *Thukam*, *Ammay*, *Visuri* and *Vekkai* in Tamil. *Dodda roga*, *Mundi roga*, *Moosa roga*, Canarese. *Pedda*, *Moosa rogamu*, Telugu. *Bàra àzàr*, Hind.

Wounds and Bruises	Kayangaloom-sarayavoo-caloom. காயங்களும் சரா யவுசளும்.
Hernia........................	Kodal-vathum. குடல்வாதம்.
Sore Teats	Mooly-vadippoo. முலை வெடிப்பு.
Mange	Soree. சொரி.
Leech in the Nose	Mookkil-uttay. மூக்கில் அட்டை.
Broken Horn................	Odyuntha-komboo. உடைந்த கொம்பு.

MEMO. ON FODDER GRASSES.

In India grass is rarely cultivated for grazing purposes, nor is it cut generally and stacked as hay. If we except the cereal and millets that are grown for the grain, and the stalks or straw are stacked, but sometimes put to other uses. A large number of grasses are to be met with in most parts of India, but their rapid growth and subsequent dryness from climatic causes unfits them for pasture, but the natives from practical experience burn down their pasture-lands as soon as the grass becomes coarse and with the first shower of rain the young blade shoots up and furnishes excellent pasturage. This is a common practice. Most grasses are nutritious and contain much saccharine matter in their composition. "Grass as fodder for cattle is not of less value than corn for human food." I enumerate here a few of the grasses, pulses and millets whose straw, stalks or haulms, met with on pasture-grounds, are in general use for feeding cattle.

Latin Names.	English Names.	Tamil Names.	Remarks.
Andropogon barbatum.	Trailing grass	Cúdi pilloo. குடைப் பில்லு.	
Do. Martini.	Roussa grass............	Camachee pilloo ...... காமாச்சி பில்லு.	Grows wild and is known as the *rumna* grass in the Deccan; the dry grass is given to cattle and horses; believed to be nutritious although a coarse-looking grass.

Latin Names.	English Names.	Tamil Names.	Remarks.
Andropogon Schœnanthus.	Surfeit grass............	Mantha pilloo. மாந்தப் பில்லு.	
Apluda Aristata	Silver grass	Cashee muttan pilloo. கழிமுட்டான் பில்லு.	
Chloris barbata	Peacock crest grass...	Myel kondai pilloo ... மயில் கொண்டை பில்லு.	Resembles the Harriallee grass; makes good fodder for cattle. May be converted into hay.
Cynodon dactylon ...	Harriallee, or dog grass.	Arugam pilloo .... அறுகம் பில்லு.	One of the commonest and best of Indian grasses, grows well and freely everywhere; makes excellent fodder, being the sweetest and most nutritious of pasture for cattle or sheep and is convertible into excellent hay. When cultivated, freely manured and irrigated, produces from 6 to 8 crops in the year.
Cynosurus Indicus ...	Winding grass	Coonja pilloo. குஞ்சப்பில்லு.	

Cyperus hexastachyus.	Sedge grass............	Korai pilloo .... கோரைப் பில்லு.	Grows commonly, but prefers a light open soil. Cattle eat it freely.
Do. Pangorei ...	Creeping grass.........	O'or pilloo. ஊர்ப் பில்லு.	
Dolichos Tetraspermus.	Country beans	Avarai cody .... அவரைக் கொடி.	Grown on account of the pods which furnish a decent vegetable. The vines or haulms are given to cattle.
Do. unifloris ...	Horse gram	Kolloo...................... கொள்ளு.	Chiefly cultivated as a dry crop on account of the grain which is in general use for horses and cattle; supplies excellent fodder for cattle and sheep, and if irrigated, will produce from 6 to 8 crops in the year. Makes excellent hay.
Eleusine Coracana ...	Ragee or Natcheny straw.	Kayvaru tattoo......... கேழ்வரகு தட்டு.	The stalks are given to cattle. Is grown under both wet and dry cultivation on account of the grains.

Latin Names.	English Names.	Tamil Names.	Remarks.
Eleusine Œgyptica ...	Famine Corn, or Finger grass.	Mutthenga pilloo ...... மத்தங்காய்ப் பில்லு.	Supplies good fodder for cattle; the seeds are nutritious and eaten by the poor during seasons of scarcity. Uncultivated; grows commonly in most places.
Ischæmum Cibare ...	Ring grass	Caducan pilloo. கடுக்கன் பில்லு.	
Lablab Vulgare	Large-seeded Dolichos.	Mochay cody........... மொச்சைக் கொடி.	Cultivated as a field culture on account of the beans. The haulms are given to cattle.
Langurus Oovatus ...	Spiked Hare's tail grass.	... ...	Furnishes good fodder for cattle. Grows abundantly at the Shervaroy Hills; yields soft tufty herbage.
Oryza Sativa..........	Paddy (Rice) straw ...	Vikkul .... வைக்கோல்.	The chief dry fodder of cattle throughout the year in India. The plant before it seeds makes excellent green food for cattle and sheep; is capable of conversion into good hay.

Panicum Antidotale...	Live grass	Peeshi pilloo. பீசைப் பில்லு.	
Do. Grossarium..	Stalk grass	Cumbum pilloo. கம்பம் பில்லு.	
Do. Ischœmodies	Shield grass	Thundium pilloo. தண்டையம் பில்லு.	
Do. Italicum......	Italian millet straw...	Tenney pilloo .... தினைப் பில்லு.	Makes tolerable cattle fodder for village cattle; is grown on account of the grains as a field cultivation.
Do. Jumentorum	Guinea grass............	Shonai pilloo............ சோனைப் பில்லு.	Supplies excellent fodder for cattle, and when under irrigated culture, produces from 6 to 8 crops during the year and makes excellent hay.
Do. Miliaceum ...	Little millet straw ...	Varagoo pilloo .... வரகு பில்லு.	Makes tolerable cattle fodder for village cattle; is grown on account of the grain as a field cultivation.
Do. Miliare	Samai straw	Samai pilloo .... சாமைப் பில்லு.	Do. do. do.

Latin Names.	English Names.	Tamil Names.	Remarks.
Panicum Palmifolium	Palm-leaved Panic grass.	Verie pilloo ………… விரைப் பில்லு.	Grows wild; makes ordinary fodder.
Do. Ramosum…	Fowl's foot grass ……	Cohee-in-kal pilloo. கோழியின்கால் பில்லு	
Do. Stagninum..	Twisted grass ………	Murucuraw pilloo. மருக்குருப் பில்லு.	
Do. Verticillatum.	Sticky grass …………	Oottoo pilloo ………… ஒட்டுப் பில்லு.	Furnishes good fodder for cattle when young; requires a good soil and shade.
Do. Violaceum ..	Cloth grass …………	Seelai pilloo. சீலைப் பில்லு.	
Poa bifaria …………	Basket grass…………	Coodai pilloo. கூடைப் பில்லு.	
Do. Malabarica ……	Cleft grass……………	Camaree pilloo. கமரிப் பில்லு.	

Pommerullia Cornucopi.	Ant grass	Masuru pilloo. முசுறுப் பில்லு.	
Penicillaria Spicata ...	Spiked millet	Kumboo tattoo......... கம்பு தட்டு.	The stalks are given to village cattle; cultivated as a field culture on account of the grain.
Phaseolus trilobus ...	Three-lobed Phaseolus	Nurry pitunkai cody. நரி பைத்தங்காய் கொடி.	Grows wild; the green haulms are given to cattle; reputed as good fodder for milch cows when procurable; may be cultivated and converted into hay.
Do. Roxburghii	Black gram	Oolundoo cody .... உளுந்து கொடி.	Grown as a field culture on account of the gram which is greatly esteemed by the natives. The haulms are given to cattle.
Do. Mungo......	Green gram	Pucha pyaroo cody ... பச்சைப்பயறு கொடி.	Do. do. do.
Rottbœllia lævis	Stick grass	Cashee pilloo. கழிப் பில்லு.	

Latin Names.	English Names.	Tamil Names.	Remarks.
Schacharum sponta-neum.	Thatch grass…………	Nanel ………………… நாணல்.	A very tough grass. Buffaloes feed on it, and village cattle take to it during seasons of scarcity.
Sorghum Vulgare …	Great millet stalks….	Cholum tattoo ……… சோளம் தட்டு.	Cultivated as a field culture on account of the millet. Supplies good green food and under irrigation several crops may be secured during the year: is highly nutritious food for cattle. The dried stalks form the chief food for cattle and horses under the name of *kudbee* in the Deccan for the greater part of the year.
Tanicum Marginatum	Leaf grass ……………	Ellay pilloo. இலைப் பில்லு.	
Zea Mays ……………	Indian Corn or Maize.	Mukka-cholum tattoo. மக்கா சோளத் தட்டு.	Is grown on account of the corn; the stalks are given to cattle, being very coarse and tough; they only eat the leaves.

INDEX.

	Page.
Abortion	39
A Commissariat Officer...	11
Aden Cattle	24
After-birth or Placenta ...	43
Age at which Heifers breed	14
Age at which Bulls propagate	14
Age of Cattle	33
—— of Sheep	128
Aghati grandiflora	126
Amrit Mahál Cattle	17
——————, The	9
Anthrax Fever	63
Apoplexy	64
Appendix	148
A superior breed of cattle.	21
Best breed of Sheep	123
Bloody Urine	81
Blown	79
Bottle-churning	53
Brahmin Bulls	10
Broken Horn	100
Bronchitis in Cattle	65
—————— in Sheep	134
Buffalo, The	107
———— Calves	110
————, account of, from Rice's Manual	109
Butter	53
Butter-making	52
Calculi	67
Calves	56
Calving	41
Castration in Bulls	26
———— in Rams	120
Catarrh in Cattle	66
——— or Cold in Sheep ..	133
Catching of Bullocks	15
Cattle Poisoning	69
Chitaldroog	12
Chokatu Buffalo	109
Choking	67
Churns	53
Coimbatore Sheep	116
———— breed of Cattle..	22
Colic	68
Colour of breed	13
Composition of Milk, The	50
Constipation in Cattle ...	69
Costiveness in Calves	57
Country grains as food for Sheep	125
Cow-pox	55
Cubbon, Sir Mark	118
Diarrhœa in Cattle	70
———— in Sheep	130
———— in Calves	57
Diseases of Cattle	63
———— of Sheep	128
———— of the Feet	96
Dislocation	97
Distension of the Rumen.	74
Division of Cattle into herds	11
Dropsy in Cattle	73
Dumba Sheep	119
Dysentery in Cattle	71
———— in Sheep	129
English Cattle	157
———— and Vernacular names of Cattle-diseases	158

Page.

Epizootic Aphthæ 77
Ewes 120
Fardel Bound 76
Fat-tailed Sheep............ 119
Fever 75
Flies 138
Food of Milch Cows 58
Food of Working Cattle in Coimbatore 62
Food of Milch Cows in the Punjab 61
Foot and Mouth disease. . 77
Four-horned Sheep......... 119
Gad Fly, The 137
Ganjai or Gujarat Buffalo 109
Garget 54
General Morgan's Condimental Food for Cattle. 61
Ghee 53
Goats 141
—— of Mysore............. 145
——, variety of........... 143
Hagalvadi.................... 12
Hallikar...................... 12
Hamaturia 81
Hernia 98
Hissar Bulls................. 23
House-churning 52
Hove 79
Hullu Buffalo 109
Hurrianah Cattle Establishment 23
Hydatids 82
Hydrophobia in Cattle ... 78
———— in Sheep ... 136
Imported Merino Rams... 118
Index......................... 169
Indian Cross-breeds of Cattle........... 156
—— Cross-breeds of Sheep...................... 125
Indigenous breeds of Cattle........... 7
—— breeds of Sheep. 113
Infectious diseases... 101
Inflammation of the Bowels 85

Page.

Inflammation of the Brain. 84
—— of the Heart. 84
—— of the Kidneys 88
—— of the Liver... 86
—— of the Lungs.. 86
—— of the Lungs in Sheep. 134
Inflammatory Fever 83
Introduction 1
Inversion of the Womb.. 42
Jaundice 88
Kankanhalli 16
Leech in the Nose 99
Liver Leech in Sheep...... 131
Load for Carts.............. 152
Lock-jaw 95
Loss of Cud 89
Madras Sheep 115
Malignant Sore Throat ... 90
Mange 99
Meat-eating Population... 122
Madesvaran Betta 16
Memo. of Cattle food and work 152
—— on Fodder Grasses 161
Merino Crosses 123
Milch Goats 146
Milk 48
—— Fever 44
Milking 45
—— qualities of the breed 13
Miscarriage 39
Mysore breed of Cattle ... 8
—— of Sheep ... 116
Names of the different ages of Sheep 127
Names of the different ages of Cattle 36
Navel Ill, The 57
Neat Cattle 36
Nellore breed of Cattle ... 17
—— breed of Sheep ... 114
North Arcot breed of Cattle....................... 20
One-horned Sheep 120

	Page.
Ophthalmia	96
Paralysis	89
Parturition in Ewes	139
Patna Sheep	118
Placenta	43
Pleuro-pneumonia in Cattle	86
Pneumonia in Sheep	134
Preventive means	102
Principal breeds of horned cattle in Mysore	9
Prophylactic measures	103
Public Cattle Department	11
Puerperal Fever	44
Purging in Sheep	130
Rabies in Sheep	136
Red Water	45
Respiration	4
Rheumatism	94
Rinder Pest	91
Salem breed of Cattle	21
Segregation	104
Scouring or Diarrhœa in Calves	57
Sheep Rot	132
——— Scab	128
Shepherd, The	120 & 121
Sore Teats	55
South Arcot breed of Cattle	20
South Coimbatore or Kangeyen breed	22
Speed of loaded carts	152
Splenic Apoplexy	95
Sprains	97

	Page.
Tanjore breed of Cattle	20
Tetanus in Cattle	95
——— in Sheep	135
The Circulation	3
The Fluke in Sheep	131
The influence of Bulls on progeny.	30
——— ——— Rams on progeny	124
The Husk, Hoose or Thread-worm	132
The most successful crosses	24
The Rot	132
Toda Buffalo	110
Training of Bullocks	15
Transfer to Public Cattle Department	14
Trichinopoly breed of Cattle	21
Tympanitis	79
Utility of the Cow	4
Value of Amrit Mahál Cattle	10
——— ground-nut oil cake	152
Varieties of Mysore sheep.	117
Variety of Amrit Mahál Cattle	12
——— Buffaloes	109
——— Goats	143
Weaning of Calves	13
Weight of Cattle to ascertain	35
Wounds and Bruises	98